Engineering

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# Electrical World

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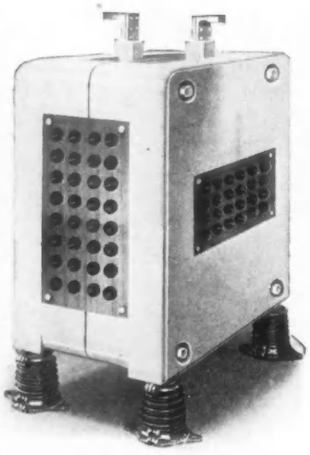

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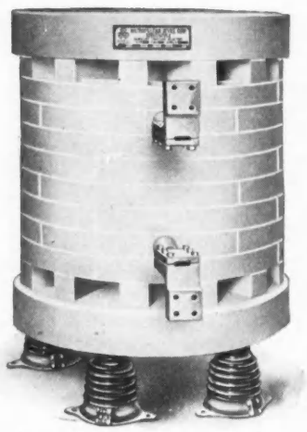

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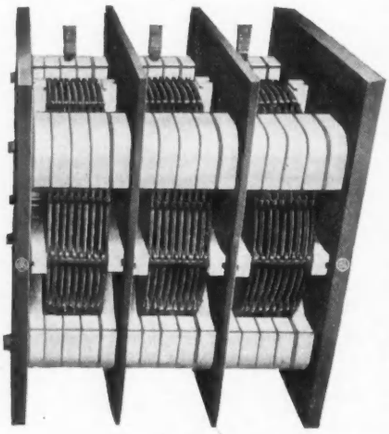

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# Electrical World

*The consolidation of Electrical World, Electrical Engineer and American Electrician*

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New York, Saturday, May 20, 1922

*Volume* 79 *Number* 20


## *What Will You Do with It?*

WHAT will you do with the convention? Here is an investment in education, a presentation of experience, a free offering of opportunity organized by the National Electric Light Association and provided through the generous effort of many workers. It is a contribution of practical worth to every electrical man.

What will you do with it? These committee reports, the records of the discussion, your memoranda of what you heard and saw at Atlantic City, the definite suggestions and advice which it all conveyed are tools to work with, knowledge to plan with, inspiration and example to spur you on. Shall it be actively applied and purposely utilized or shall it be forgotten?

SELF-EDUCATION and employee education are one of the great problems of the utility executive today—be he the chief or the department head. Conditions, methods, objectives change more rapidly than ever before in the world's history. Technical training, the lessons of early experience, the laws and customs of the craft are more and more becoming background resources. To serve well, a man must be alive to the fast unfolding evolution of the industry and think with its leading minds.

To increase the efficiency of an organization staff through the broadening influence of education large sums of money are spent each year even by companies of moderate size. For our larger institutions the annual appropriation runs into a vast total. What does this money bring? Not book learning only—rather the quickening, steadying impulse that comes from contact with other men and other minds, from observation and knowledge of contemporary problems and how they are met.

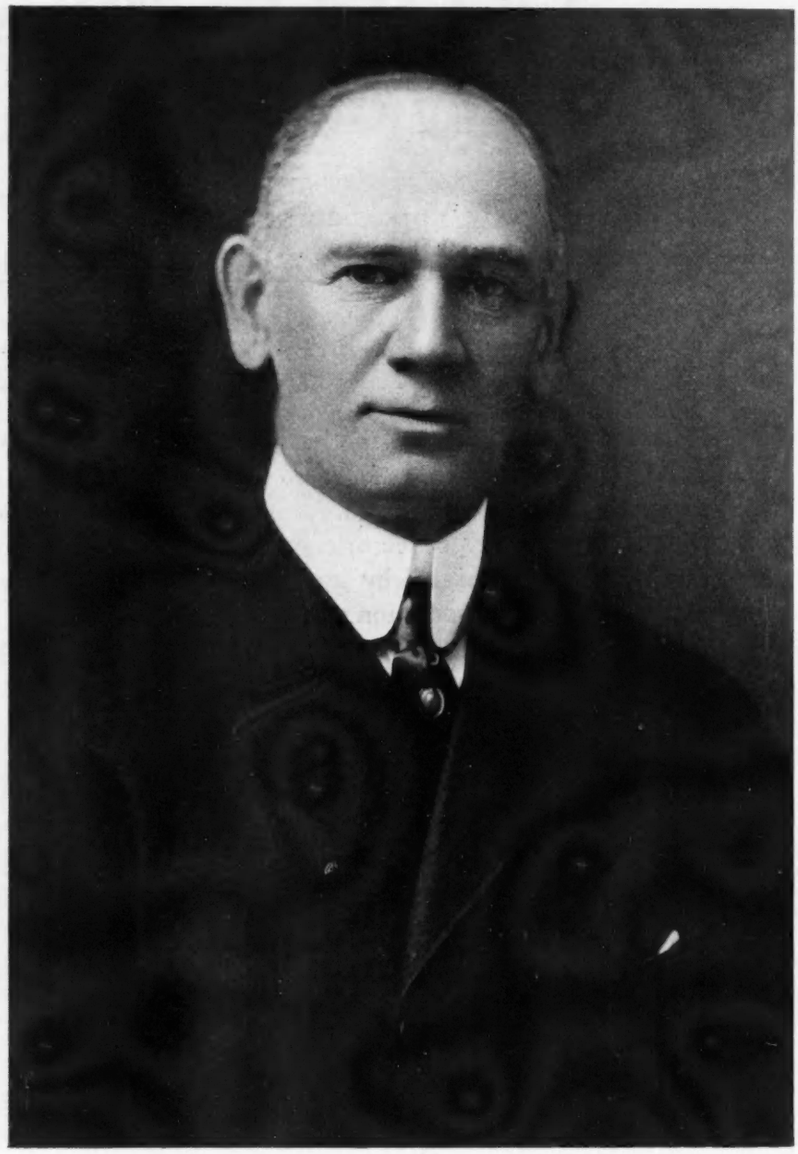
The pressing need of these great modern business and engineering enterprises is for bigger, broader, better-thinking men. The great product of education within the organization comes through the disclosure to the observant executive of promising material for future leaders and its development from within.

THE only way in which this kind of education by contact and contemporary knowledge can be acquired by the central-station man is by direct travel to other plants, or the more practical medium of the annual gathering of the N.E.L.A., its meetings, its acquaintanceship, its conferences, its chance conversations and its printed records and reports. All cannot attend, but all can gain the material yield of the year's association activity.

The question is: Will you take the product of this convention seriously and utilize it as the great opportunity which in truth it is? Will you read these pages of contributed experience just from a sense of interest and duty or will you search for ideas and use them?

# William Henry Atkins

*Pioneer central-station executive, whose technical insight and business ability have benefited the industry for a generation.*



IT IS the splendid distinction of the electrical industry that it is still young enough to enjoy the ardently active services of many able leaders who have contributed to its upbuilding from small beginnings. These men, with a vision strengthened by experience, controlled by matured judgment and directed by indomitable faith in the future of electrical service, take a keen personal pleasure in their work. Without blowing of personal trumpets they quietly go straight to the point of their problems, keep in phase with progress, inspire their subordinates to responsible achievement, and attain success over and over again by their openness of mind and practical understanding.

One of these responsible leaders among electrical men is William H. Atkins, for almost thirty-five years general superintendent of the Edison Electric Illuminating Company of Boston. Mr. Atkins was born at Waterville, Me., March 29, 1859, and after attending school in Maine and at Boston, resided in Portsmouth, N. H., until 1884, when he was seized with the desire to learn the electrical business. Moving to Brockton, Mass., he at once obtained a position with the New England Wiring Company, reporting for duty with a hammer, screwdriver and pair of pincers to help other recruits wire a local fire-engine house. He continued in the wiring field in various parts of New England until Dec. 1, 1887, when he was appointed an inspector for the Boston Edison company. His wiring jobs had included many pioneer installations, in some of which Mr. Edison was directly concerned and which were the first of their kind connected to the Boston system.

So energetic and thorough was Mr. Atkins' work from the first that he was soon made acting superintendent and shortly afterward general superintendent. In close association with C. L. Edgar, president of the company, Mr. Atkins' constructive influence, courage and alertness have been powerful factors in the development of the Boston company from a small urban central station to a metropolitan system serving over 600 square miles in eastern Massachusetts, supplying nearly 150,000 customers and operating about 175,000 kw. in generating equipment besides important interconnections. Every branch of the company's commercial and engineering operation is under his supervision. Courtesy and good will are his watchwords.

Mr. Atkins is a member of the Edison Pioneers and treasurer of the Association of Edison Illuminating Companies. He was a member of the executive committee of the National Electric Light Association from 1918 to 1922 and its treasurer from 1915 to 1919.

# Editorial Comment

Electrical World, May 20, 1922

Volume 79 Number 20

### Progress, Co-operation and Optimism Mark N. E. L. A. Convention

A LARGER-MINDED, more healthy, more ambitious National Electric Light Association was in convention at Atlantic City this week. It is only natural that consistent work should make each year show advance, and each convention should be better than all the others when looked at from that angle. But it can be truthfully and fairly said that this convention did mark some exceptional progress, as should be apparent from the complete report of all sessions presented in this issue.

The industry is back of the "better business" movement with a unanimous voice. Central-station companies know that they should now, and can now, do something to develop business, and the co-operation between central-station companies and the other branches of the industry in this movement shows that when a job is to be done the electrical industry can handle its own problems and do the job. The "Electrify America" movement is under way with a swing.

Another accomplishment which deserves sincere and hearty commendation is the concrete progress—and agreement—reached in co-operation with the telephone interests on the induction-interference problem. At Atlantic City this week this accomplishment was strikingly emphasized by the large number of telephone men in attendance and by the dramatic demonstration by the American Telephone & Telegraph Company which made possible a half hour of simultaneous meeting with the Pacific Coast association on Thursday evening. This is another evidence that the electrical industry can solve its own problems without outside compulsion or aid.

Deeper down, or perhaps merely more analytically, this industry has shown at this convention that it is closer to its work, that it is in more intimate contact with its problems of whatsoever nature they may be—finance, public relations, management, engineering, operating, accounting and, perhaps more than anything else, commercial. This is a most healthy sign and augurs well for continued solid progress.

### Better Fixed-Capital Records Are Needed

CLOSE observers of utility affairs before state commissions have realized for a long time that better records of fixed capital would expedite procedure, help convince the regulating tribunal as to the reality of the investment claimed, and aid the utilities themselves in estimating the costs of projected work. Therefore it is a pleasure to call attention to the exceptionally fine treatment of this subject given in the report of the fixed-capital records committee this week at the N. E. L. A. convention. At present too many companies are working with very unsatisfactory data as to fixed capital. Information satisfactory to one department does not meet the needs of another; vital statistics as to property costs and physical data are either lacking or scattered, and there is a bad gap between book values and investment costs. In the report above mentioned the whole subject is co-ordinated with rare skill, the results of practice in a few exceptionally progressive cases are set forth and the groundwork is laid for a much broader detailed application of fixed-capital analysis than the industry has been accustomed to in general. We commend the study of this report to all executives concerned with utility finance and regulatory affairs.

### Real Progress on Problem of Inductive Interference

THE adoption of a code of principles governing the handling of inductive-interference problems is the encouraging announcement made at the session of the inductive-interference committee at the Atlantic City convention. Naturally the joint general committee has not been able to arrive at an agreement that will suit everybody in every particular or that can be said to be final. Such an ideal is never reached in human affairs. The significant fact is that the committee has reached a unanimous agreement that is not only workable but the best real foundation for the work ever proposed. On it can be built a structure that will keep pace with the industry as it grows. Back of it is a story of honest effort at co-operation and attempts to reach a complete and thorough understanding that is far bigger than the code of principles and cannot be put into words. Only those who were at the meetings or who participated in the committee work can begin to appreciate this.

It is now incumbent on the central-station organizations of the country to back the work of the joint committee and put the code of principles into practice in the same spirit of honesty and fair play that led the engineers responsible for the work to make public interest paramount. Without this support the work of the men who have given their time unsparingly will be lost. The industry cannot afford such a loss.

### Possibility of Avoiding Parallel Sessions Needs Reconsideration

THIS year's experience at the National Electric Light Association convention seems to indicate more than ever the need of finding some plan of arranging the program so that members can get the most out of the convention papers and discussions. So many parallel sessions of general interest are conducted that members find it bewildering trying to decide which session they shall attend. Aside from making it difficult for members to attend the sessions they desire, the present method of procedure has the objection that it draws attendance away from some sessions, which thereby suffer from insufficient discussion.

One suggestion which embodies the nucleus of a solution deserves careful consideration. It is that simultaneous committee reports be presented in the various

geographical sections at regular intervals throughout the year and that the national committee chairmen present the high points of these periodic reports and discussions in general session before the entire membership at the national convention.

This plan would have the additional advantage of reducing the time lag in presenting information. At present the membership has to wait until the end of the association year for reports from the committees. The proposed plan would enable the presentation of information as it becomes available. At the end of the year it could be compiled and presented in the usual form.

Whether this method or some other will solve the problem remains to be seen. However, the situation deserves the earnest consideration of every one, and especially of a committee of the N. E. L. A., which should be appointed at once.

## Development of Small Water Powers

DESPITE the handwriting on the wall bearing menace of shortening coal supply and rising costs, comparatively little is being done toward full utilization of our water powers. In particular, the small streams that do not promise the founding of a big enterprise very generally run to waste. We in this country are somewhat contemptuous of small things, even of small gains, and consequently are not prone to bother with falls that promise at most a few hundred horsepower. Abroad, on the other hand—in France, for instance—they would be promptly set to work in the common interest. In that country there are scores, if not hundreds, of such small developments, each one helping to save the hard-won and costly coal. The little rivers we have in mind commonly have no considerable fall at any one convenient place, but may have fifty or a hundred feet drop in a mile or two, often with facilities for cheap storage to a moderate amount. Their development involves foresight and special methods, perfectly well known but too rarely used.

There is, in particular, often excellent opportunity for the installation of automatic stations with asynchronous generators controlled very simply from the main point of load distribution. There should be one control station with attendance, perhaps not the largest of the group, with automatic auxiliaries along the stream at the other available falls. Our total drop of a hundred feet may be then actually developed in three or four units, with storage preferably at one of the upper falls. The several stations can be used just like the generators in a single station, each being cut in when needed. In fact, with upstream storage, the generators would be cut in in succession as the peak came on and taken off with the diminishing load. The real problem for consideration is the relative cost of the separate installations as compared with hydraulic unification in its bearing on overhead expense, the operating expense being almost the same.

With widely separated stations unification is almost out of the question, and it becomes entirely so in the not unusual cases where the powers are on neighboring streams. A beginning has been made in this line of work, but if full benefit is to be obtained from the co-ordinated operation of falls giving only a hundred horsepower or less, complete advantage must be taken of automatic operation. How far the scheme can be advantageously worked out in supplying feeders for larger networks remains to be seen, but there are plenty of cases where at low stages of the main supply a few hundred kilowatts from other sources would be most advantageous. We should welcome reports from stations thus aggregated, for knowledge of successful operation would be of great benefit in the conservation of the water supply that on small streams as on large is now going to waste.

## Engineering Education— Can It Include Business Education?

EDUCATION for the profession of engineering has been a constant topic of discussion for many years. Both educators and the employers of engineering graduates have taken active part. There has been little difference of opinion as to the desirable qualities and abilities of the young engineer, but a great deal as to how these qualities and abilities may be imparted during the period of formal training. On the side of the employer complaint is made that the product of the colleges is usually wanting in such things as power of expression, initiative, independence of thought, readiness to accept responsibility, and in the scientific and technical equipment pertaining to his special branch of engineering. This criticism has often been accompanied by suggestions of new courses for inclusion in the curricula of engineering colleges and the adoption of methods which would stimulate the development of the qualities usually found to be lacking.

The second public conference on commercial engineering held at the Carnegie Institute of Technology the last week in April, called by the United States Commissioner of Education, is probably the greatest single effort that has yet been made toward reaching definite conclusions on this interesting and important topic. The conference was largely attended, delegates were drawn from every branch of industry and from the principal schools of engineering of the country, a number of important papers were presented, and there was much individual comment and discussion. Viewpoints and suggestions of industry, as outlined above, were renewed, special emphasis being laid upon the need of industry that young engineers should have had training in business, financial and commercial branches of study. Data were presented showing the extent to which these courses are already included in our principal schools, and several instances of new curricula in "commercial engineering" were described.

On the other hand, there was a decided evidence that educators as a whole are skeptical as to the value of the inclusion of business courses in the normal four-year undergraduate curriculum. Briefly stated, the reply of the teachers of engineering is that instruction in the fundamental scientific studies is on all accounts the most important problem in engineering education, that the four years' course is all too short for giving these fundamental studies and the beginnings of engineering specialization, that the present content of general and cultural studies is about the maximum that can be tolerated, and that the graduate of the present standard course is really better qualified for learning the mechanism of business in engineering industry than he would be if his technical training were curtailed in the interest of instruction in modern business methods.

There remains, notwithstanding these contentions, the pressure of business competition and the demand for young material as nearly as possible fitted for entering into efficient participation in industry. From this point of view it is natural that industry should lose sight of the importance to men supposed to have technical training of instruction in the foundations of that training, which are to be found only in the underlying sciences. For the most part, industry has seen only the present problem of efficient increase in production, rather than the building of a structure which can meet readily the technical problems involved in the expansion of industry through the introduction of new methods. Furthermore, as seen by the educators, the methods of business and commerce vary widely in different fields of industry and may be acquired perhaps to best advantage by experience within the industries themselves and after leaving college, while, on the other hand, college is the only place where sound training in the technical principles of the profession may be satisfactorily given.

The question is one which reaches to the very roots of the engineering profession and industry. While the conference at Pittsburgh cannot be said to have reached any definite conclusion, it nevertheless had this outstanding feature, that it threw great light on the problems of the educators on the one hand and those who use the products of education on the other. Undoubtedly young men entering industry may be better equipped than they are at present. It cannot be said, however, that this added equipment can be attempted with profit in our present standard four years' course in engineering. Therefore such additional training, if it must be given in the college, can only be had at the expense of a longer period of formal training. After all, this is only a natural result. A good engineer is not necessarily a good business man, and vice versa. A man may perhaps be both, but he cannot expect to be unless he devotes the proper period of training to each great field.

## Detailed Analysis of Service Outages Essential to Greater Reliability

COMPILATION of data on service outages of power-plant equipment is highly commendable, but it is of little avail unless it is followed to a conclusion as to why the interruptions occurred. An excellent suggestion along this line was made at the prime-movers session of the Technical Section of the National Electric Light Association at Atlantic City this week, one which should be seriously considered and observed by users of turbo-generators at large. It was that very complete and detailed records be kept of the *causes* of service outages, so that operators and manufacturers may get together on some definite basis for eliminating them. As E. H. Sniffen of the Westinghouse Electric & Manufacturing Company pointed out, the outages which have occurred are not due solely to weaknesses in design. In some cases proper care has not been exercised in the erection and operation of the equipment. If the operators and manufacturers will jointly study the reasons for outages, they will be able to make these most important adjuncts of electric service systems more nearly 100 per cent reliable.

The same suggestions can be applied to advantage in connection with all apparatus in which operators are concerned. Economy of performance is very important, but its usefulness is small if service equipment representing a large investment is forced to lie idle because of the failure of one piece of apparatus in the chain. Reliability is the chief consideration in electric service apparatus, and it can be greatly increased by detailed analysis of the causes of outage and by co-operation between operators and manufacturers.

## New Light on the Atom

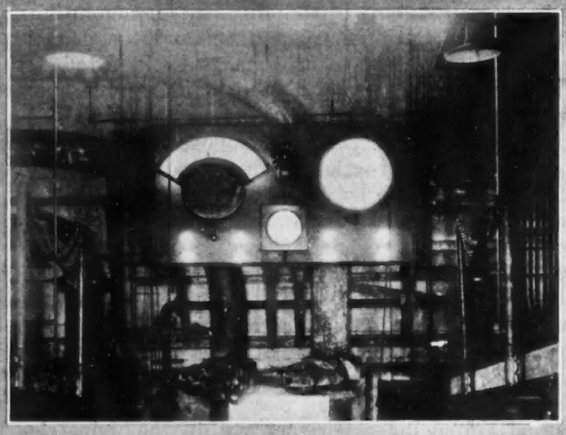
TO A PERSON who has not followed the electron theory the suggestion that the atoms of all substances are made up of the same constituents, namely, electric charges, may seem quite incomprehensible. As early as 1815 Prout ventured the belief that the atomic weights of the different elements were whole numbers and, that of hydrogen being one, all the elements were aggregates of the atoms of hydrogen. Since his time many facts have appeared in support of this idea, and it now appears that we are on the verge of a conclusive proof as to its accuracy. When we come to the results of experimental research by Soddy, J. J. Thomson, Rutherford, Langmuir and others, we find the whole field opening up into a mass of evidence which cannot be questioned. Perhaps the most striking results in this field are the identity of electric particles which may be obtained from all substances, the fact that the atomic weight of radioactive lead varies according to its origin, and the obtaining of hydrogen from nitrogen.

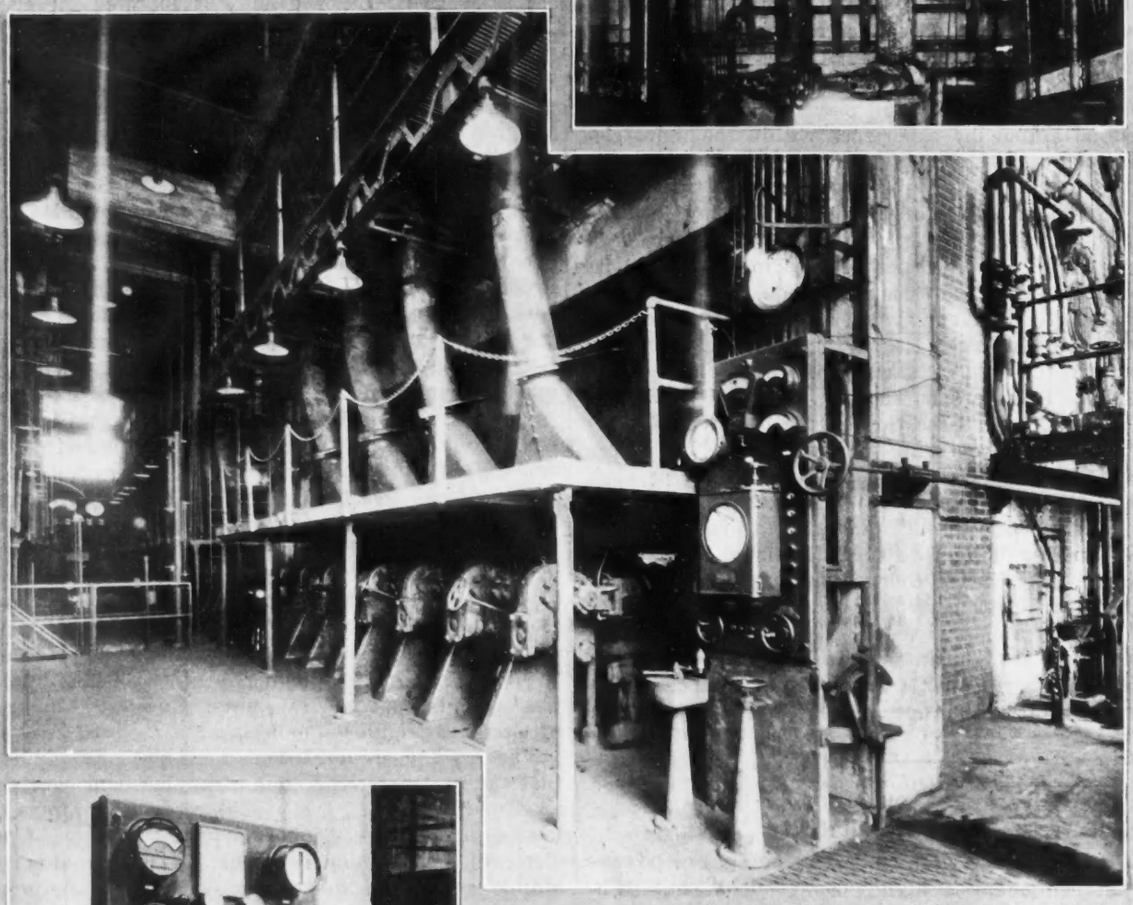
One of the greatest difficulties in the further substantiation of this theory of a common nature for all the elements has been the fact that the atomic weights of some of them do not appear as whole numbers, as would be required if all were made up, say, of the fundamental hydrogen. Now even this difficulty is disappearing with a further study of the elements which occur in two or more forms all having identical chemical properties but different atomic weights. Such pairs or groups of elements are known as isotopes.

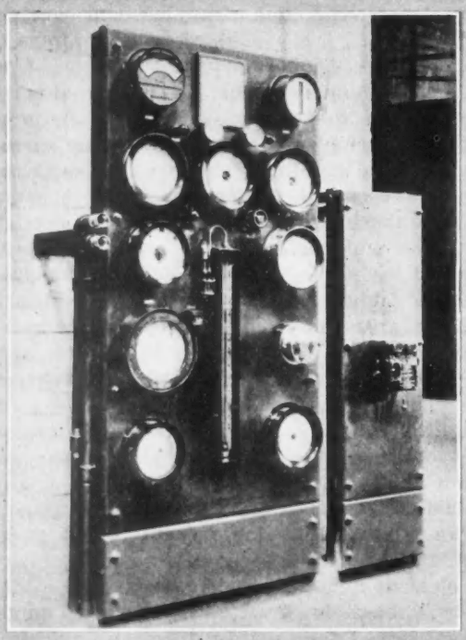
The gradual accumulation of evidence now indicates that the nucleus of the atom of any element consists of a number of free positive charges or protons, the nucleus of hydrogen having one, and the nuclei of other elements having numbers equal to the corresponding atomic number of the element. Electrons in number equal to the number of protons in the nucleus surround the nucleus in some definite arrangement. The electrons determine the chemical properties of the substance. Since they are much lighter than the protons, the latter determine the atomic weights. The atom of an isotope has associated with it in some way additional hydrogen atoms, which do not, however, upset the equilibrium adjustment between the protons of the nucleus and the surrounding electrons. In this way the atomic weight of isotopes may vary without showing a corresponding variation in chemical properties.

Great light has recently been thrown on the fractional values of atomic weights of certain substances by the brilliant work of F. W. Aston, working with J. J. Thomson's method of positive-ray analysis. He has shown that a large proportion of the elements showing fractional atomic weights are merely mixtures of isotopes of the same element and that the mass of each of these component isotopes is invariably a whole number. This removes one of the greatest difficulties and proves practically beyond question that the atoms of all the elements are made up of the protons and electrons.

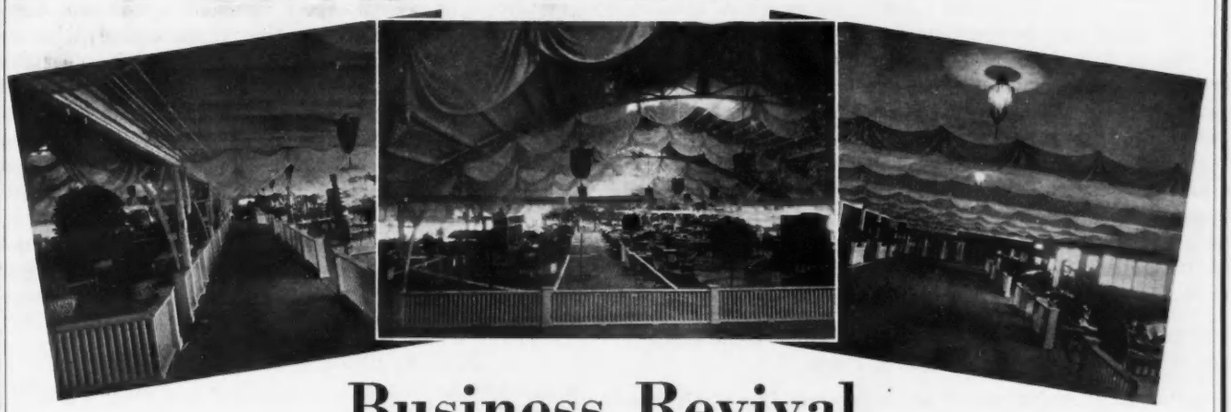
# Centralization of Instruments and Control an Aid to Greater Economy







THE present tendency toward the more extensive use of instruments that will make possible observation of mechanical operating conditions and toward the centralization of these instruments and control apparatus is highly commendable and ought to become still stronger. Equipment carrying high-economy guarantees will not alone assure the best plant economy. Means must be had to facilitate the observation of the conditions under which the apparatus is operating and to adjust these conditions if they depart too widely from those under which the apparatus is designed to give its best performance. Instruments and control apparatus should be centrally located where they may be used in conjunction with one another. Methods to this end used in plants of progressive companies include the individual boiler instrument and control panels, the centralized boiler-room meter and control board, the turbine and auxiliary panelboard and the heat-balance board for boiler room and turbine room combined.



# Business Revival Dominates the N. E. L. A. Convention

## Returning Prosperity Heartens the Electrical Industry—Inter-Association Understanding Growing Closer—Public Relations Becoming More Intimate —Mastery of Technical and Commercial Problems Constantly Advancing

THE returning tide of better business flooded the forty-fifth convention of the National Electric Light Association with optimism this week at Atlantic City, when delegates and guests from every corner of the United States met to discuss anew the far-reaching problems of the central-station industry. For the first time in the long and brilliant history of the great organization, a business-development symposium occupied a place of honor on the crowded program, and for the first time definite fundamental suggestions were advanced for the resolution of the difficult issues of inductive interference into a simpler form making possible their ultimate suppression as inter-utility problems bearing within themselves the seeds of discord. New also to the industry was the spirit of closer friendship and team play evident at the convention between its component branches, and the signs of engineering and commercial progress, of improved conceptions of responsibility in public service, of greater precision and larger ideas in accounting, and, best of all, the evidence of a true gain in public relations and a sincere and determined policy of making real friends with the public, justified the conviction that golden years of service and development are ahead.

On Friday morning a telephonic message was received from Secretary of Commerce Hoover, who regretted his inability to be present at the convention and expressed his firm belief in wide interconnection of electrical lines and the establishment of superpower systems. Mr. Hoover said that he was detained in Washington because of the urgency of the coal situation, and he felt that he had served the electrical industry better there than he would have served it had he attended the meeting.

### Election of Officers

The following officers were nominated and elected at the concluding general and executive session on Friday morning:

President, Frank W. Smith, United Electric Light & Power Company, New York.

First vice-president, Walter H. Johnson, Philadelphia Electric Company, Philadelphia.

Second vice-president, Franklin T. Griffith, Portland Railway, Light & Power Company, Portland, Ore.

Third vice-president, J. E. Davidson, Nebraska Power Company, Omaha.

Fourth vice-president, R. F. Pack, Northern States Power Company, Minneapolis.

Treasurer, Walter Neumuller, New York Edison Company, New York.

These additions to the executive committee as members at large were made: T. A. Kenney, Consumers' Power Company, Jackson, Mich.; P. S. Arkwright, Georgia Railway & Power Company, Atlanta, and H. C. Abell, Electric Bond & Share Company, New York. W. E. Robertson of the Robertson-Cataract Electric Company, Buffalo, was re-elected as a representative of the Electric Supply Jobbers' Association, and James R. Strong, president of the National Association of Electrical Contractors and Dealers, was elected to represent the contractor-dealers of the country, provision having been made in the by-laws for that purpose. During the morning session Mr. Strong made a short address on the "better business" movement.

Frank W. Smith, the retiring first vice-president, who now assumes the presidency of the association, was born in Alden, N. Y., June 22, 1867. From the time he was thirteen he has been continuously in the service of the United Electric Light & Power Company of New York. His first big advancement was to general clerk and then to paymaster. In 1891 he was made assistant auditor and eight years later he was elected assistant secretary of the company. In 1905 he became secretary and eleven years later was elected to the combined office of vice-president and general manager.

During Mr. Smith's administration of the affairs of the United Electric Light & Power Company he has

built the great Sherman Creek generating station, supplying energy to the upper part of New York City, as well as a number of substations and a modern service building, but perhaps his finest achievement is the new Hell Gate Station on the East River, recently described in detail in the ELECTRICAL WORLD. He has been an active advocate of the electric vehicle and took a prominent part in reorganizing the N. E. L. A. along broader lines of activity. For a number of years he has headed the association's lamp committee, the annual report of which is a comprehensive chronicle of vital facts relating to electric lighting.

### APPOINTMENT OF TECHNICAL COMMITTEE CHAIRMEN AND MEMBERS REVISED

A slightly revised method of appointing chairmen and members of technical committees was proposed and acted on at the opening session of the Technical Section on Monday afternoon. The selection of the chairmen will be the duty of the chairman-elect of the section as before, but will hereafter be based on the approval of the vice-chairman-elect and six members-at-large of the incoming executive committee. Advantage will be taken of the opinions and knowledge of geographic sections by automatically making the chairmen of the geographic section committees also members of the corresponding national committees.

The procedure of appointment prescribed by constitutional amendment will be as follows:

The chairman-elect, with the approval of the vice-chairman-elect and the six members-at-large of the incoming executive committee of the section, shall appoint the chairman of each of the committees, such committees including automatically the chairman of each of the geographic divisions, and he may with the approval of the executive committee appoint such other members of such committees as may be deemed necessary.

## First General and Executive Session

### President Bump Strikes Optimistic Note— Executive Manager Aylesworth Describes Work of Year — Encouraging Reports

IN OPENING the convention President Bump contrasted the conditions of a year ago, when the country was swept by a wave of pessimism, with conditions today, when the outlook for all branches of the industry is brighter, healthier and bigger than ever before in its history. He said that the utilities can look forward confidently to a broad investment market which will justify proceeding with plans for the extension of service. A careful survey indicates, said Mr. Bump, that there is more new work planned and under way at the present time than at any time in recent years, if not at any time in the history of the industry.

Mr. Bump told his hearers that the electric light and power industry is in a position today to finance increased facilities. Idle capacity in his estimation will be a practical impossibility for many years to come in an industry which has as yet realized only a small percentage of its possibilities.

Briefly reviewing the work of the association during the year, Mr. Bump called attention to the "Electrify America" movement and to the work of the committees on customer ownership, rural line extensions, savings banks, education, inductive interference and public information. As typical of the value of association committee work to the industry, the result of the activities of the insurance committee was cited. Through the efforts of this committee lower fire insurance rates on electrical properties will become effective as of April 15, and it is anticipated that the savings effected in this one activity will be equal to or greater than the total dues collected by the association from member utility companies during the year.

The report of Treasurer H. C. Abell and that of the finance committee, of which Joseph B. McCall, president Philadelphia Electric Company, is chairman, were next presented.

### OUTSTANDING WORK OF THE YEAR

Some of the outstanding work of the year was featured in the report of Executive Manager M. H. Aylesworth. The Technical Section has worked assiduously for better construction, more reliable equipment and greater efficiency in the production, distribution and utilization of electricity, and Mr. Aylesworth said that it is one of the greatest assets of the association to be able to command the services of so great a body of experts on its vital engineering problems. No other body of men, he said, is animated by higher ideals or works more unselfishly in the public interest than the technical staffs of public utility organizations. The successful outcome of the co-operative work of the Technical Section with the telephone interests was especially commended.

During the year there has evolved from the work of the Commercial Section a great national movement on business development in which all of the other branches of the industry have joined. Upon the central-station companies of the country, Mr. Aylesworth said, will fall the brunt of the work of shaping and directing the campaigns, and he hoped that enough enthusiasm would be obtained from the conference to make the ultimate success of the movement to electrify America a certainty.

The excellence of the work done by the various state committees on public utility information and by the Public Relations Section in cultivating good will for the industry was brought to the attention of the convention by Mr. Aylesworth, who also told of the work of the Accounting Section in further perfecting its uniform classification of accounts and in co-operating with the Federal Power Commission and the National Association of Railway and Utilities Commissioners on accounting matters.

In any summary of the conditions which surround the electric light and power industry today, said Mr. Aylesworth, two issues present themselves for attention, the necessities of growth and how they are to be financed. In the speaker's estimation it must be apparent to every observant operator that the field for expansion in the electrical industry is almost limitless. Last year almost two billion dollars was expended for new building, setting for the nation a mark never before approached. The greater part of this huge expenditure was made in cities for the purpose of housing their people. Hence there came into being a vast and still growing increase in the domestic load of the electric light and power companies, for not only is every new urban dwelling erected in this progressive country connected with central-station lines as a matter of course, but outlets for appliances are provided on a scale undreamed of a few years ago. This is not all. Cam-

paigns for the revival of business are being waged. Prosperity is on the threshold, and as it enters an industrial load far greater than any in the past must be carried by the central stations. The outlook is roseate indeed, and no one will wonder that, faced by so imperative a demand, the program for new construction adopted by the companies is of unprecedented size. But to measure up to the opportunities presented requires large amounts of capital. Fortunately money can now be had at lower rates than have prevailed for many years; operating expenses have been considerably reduced and, what is most significant of all, junior securities to the value of $60,000,000 were last year sold to customers.

### INSULL PLEADS FOR INTENSIVE PUBLIC RELATIONS WORK

In reporting on the Public Relations Section work, Martin J. Insull of Chicago, chairman of the section, said that while the industry as a whole seems to appreciate the necessity of a better understanding on the part of the public of the problems of the electric light and power companies the individual of the industry does not yet seem to understand that in order to accomplish this he or she must make it his or her personal job. The work of improving public relations, he said, is not like a technical problem to be worked out by experts and forgotten. All that the Public Relations Section can do is to point the way toward the ends to be accomplished, and the results must come from the actual work and co-operation of individuals in the industry.

As between finance and public relations, Mr. Insull is of the opinion that the latter is the more important because people with money to invest are not attracted to a business to which the public is antagonistic. He said that it cannot be impressed too strongly on executives that the education of employees in the fundamental economics of the electric light and power business is a very important part of their duty not only to their individual company but to the industry.

Commenting on the work already done in advertising and through the state committees on public information in addition to that carried on by means of motion pictures, Mr. Insull said that "public relations as an association activity has only had a distinct place for the past two years. Therefore the surface has only been scratched, but the results so far obtained do indicate the great possibilities of this work in placing the industry in its proper position in the public mind."

### SIMPLIFIED BOOKKEEPING SYSTEM OUTLINED

E. J. Fowler, chairman of the Accounting National Section, in his annual address outlined a simplified system of bookkeeping which has been in satisfactory use in Baltimore for several years and has recently been installed in two offices of the Public Service Company of Northern Illinois. It is described elsewhere.

This year for the first time the Accounting Section has made a definite, persistent and reasonably successful effort to encourage and help in organizing Accounting Section work in the geographic divisions and in co-ordinating it with the work of the National Accounting Section. Owing to the fact that meter readers, cashiers, collectors and employees at the stock-transfer windows, all connected with the accounting department, meet and deal with the public, Mr. Fowler suggested that these men be educated and broadened because of their potential influence in creating good will for the company.

### BUSINESS DEVELOPMENT

R. H. Tillman of Baltimore, chairman of the Commercial Section, accentuated the part played by the section in the formation of the joint committee for business development and the ready

**F. W. SMITH**
Vice-President
United Elec. Light & Power Co.

**M. H. AYLESWORTH**
Executive Secretary
N. E. L. A.

**W. H. JOHNSON**
Vice-President
Philadelphia Electric Co.

**FRANKLIN T. GRIFFITH**
President
Portland Railway, Lt. & Pr. Co.

**J. E. DAVIDSON**
Vice-President and General
Manager, Nebraska Power Co.

**R. F. PACK**
Vice-President Northern States
Power Co., Minneapolis

*Incoming President Smith, Executive Manager Aylesworth, and the four vice-presidents elected for the coming year.*

response from other interests to the movement. He said that the committees and bureaus of the Commercial National Section had devoted much time in formulating recommendations and assisting in every way possible this business movement because they were confident it would bring telling commercial results. Only through concerted action of the combined forces of the industry, he maintained, could the electrical business be brought out from under the cloud of depression. Mr. Tillman was of the opinion that the industry is now on the threshold of its greatest opportunity of making its usefulness felt.

### RECOMMENDATIONS OF CHAIRMAN CARLE

The constitutional amendment which automatically makes the chairmen of geographical-section technical committees also members of the corresponding national technical committees has been very effective in co-ordinating the work of the geographical and national committees, said N. A. Carle, chairman of the Technical Section, in his address. As a result of this the chief objection which has formerly been raised to geographic technical committees is eliminated. Considerable benefit has also resulted from conducting simultaneous meetings in different parts of the country and exchanging comments thereafter. These dual meetings have enabled many members to partake in discussions who found it difficult to do so before owing to the remoteness of the meeting places. With dual meetings held in November and national meetings in September and January, Mr. Carle believes that the greatest benefit can be rendered to the membership at large.

At present the personnel of many small companies cannot be utilized in committees because the companies cannot afford to pay traveling expenses to four or five meetings during the year. Mr. Carle declared that this obstacle could be removed if each section would defray the expenses of two men to each of the national technical committee meetings. Considerable interest in reports of the technical committees has been shown during the past year by colleges, more than six hundred reprints of the prime movers and overhead systems committee reports being distributed this year and the colleges being the principal recipients. To increase their interest still further and develop good will, disseminate the information available more extensively and take advantage of the opportunity of educating the men who are going into the industry, it was recommended that college sections be organized and modeled along the lines of existing company sections. If this is favorably considered, a committee should be appointed to outline the general plans. Machinery for undertaking this work is already available in the geographic sections.

The reason for extending the Technical Section chairman's term over two years is no longer operative with the present method of conducting the section activities, and it was recommended that the chairman's term be limited to one year hereafter.

### RATE RESEARCH

The rate research committee, Alex Dow chairman, after reviewing the progress of *Rate Research*, which, under the editorship of Charles E. Neil, has continued to abstract court and commission decisions affecting public utilities, and the "Rate Book," now enlarged to cover cities having a population of 20,000 or more and paying a profit to the association, summarized briefly the trend of the year's regulation and legislation.

For the first time the committee felt it advisable to make a recommendation as to a power-factor clause in rate schedules, asserting "that where power factor is one of the elements considered in a scheduled rate, or in a rider applicable to a scheduled rate, the preferable method of measuring power factor for the purpose of billing is by comparison of readings of a watt-hour meter and those of a meter registering reactive ampere-hours—that is to say, a so-called reactive-component meter. We have heretofore," the committee continued, "looked with hope and favor upon the possible use of a kilovolt-ampere-hour meter, but experience to date is that such instruments are not comparable in accuracy with the standard kilowatt-hour meters, whereas the reactive-component meter is substantially identical in construction and has the same limits of accuracy as the meters to which we and our customers now give full credence. We recognize the difficulty of specifying power factor in terms of the quadratic relations of readings of the two meters, but we point out that it is very simply arrived at by the use of a table showing the ratio of the reactive kilovolt-hours to kilowatt-hours."

The committee reported little change in the status of coal clauses or in the method of their application. Their satisfactory operation had justified them.

### WIRING

For some time the wiring committee, R. S. Hale chairman, has worked through sub-committees with a view to formulating standards as to the amount of wiring that should be installed under different conditions. This subject has two aspects, one as to the number of circuits that should be put in for a given area, and the second as to the number of sockets or convenience outlets that should be put into a given room. The committee was not ready to offer definite standards for universal adoption, but recommended that they be fully discussed not only by the central-station people but also by the contractors, architects and real-estate men. In the meantime the committee, believing that the subject of selling wiring should have more attention, has provided for a large sub-committee of commercial men on this particular subject. Educational work must be done with the following groups, named in the order of their importance: Electrical contractors, architects, building contractors, and the public. The so-called "electrical home" exhibit, it was believed, affords the opportunity to demonstrate and explain the merits of electrical equipment to the greatest number of people at the least expense.

The manufacture of the old non-standard plugs and receptacles is rapidly disappearing, and a large number of the manufacturers of heating devices, as well as many of the manufacturers of portable lamps, are using and selling the so-called double-T-type standard plugs.

The principle of the recommendation of the committee in regard to the 660-watt rule was to give up the rating of circuits by the nominal connected load or name-plate rating of small motors, etc., and, instead, to control the size of the final circuit first by the fuse and second, when desired, by providing that each final circuit shall supply not over a certain number of square feet of area (the figure appearing to be in the neighborhood of 800 sq.ft.), or the same thing can be accom-

plished by providing that the final circuit shall not feed more than a certain number of rooms, say five or six. In regard to the fuse, the code rule has been changed to 10 amp., and a very large number of inspection districts are allowing 15 amp. either openly or tacitly. At least one company reports that it is using 20-amp. fuses on the final circuit in its district without any sign of trouble.

Various tests and investigations were made by the committee covering relative bending durability of No. 16 and No. 18 lamp cord, all-rubber portable cord and the effect of steel reinforcement on binding durability. The results of these tests were published in a comprehensive manner as an appendix to the committee's report.

The "life" tests of various types of wiring under dry and damp atmospheric conditions which were started in 1917 are being continued. The scheduled physical and insulation resistance tests are not due until the fall of the current year, when a five-year period will be completed.

## Second General and Executive Session

### Symposium on Business Development Outstanding Feature—Address by Louis F. Musil on Budget Procedure in Management Control

WEDNESDAY'S session was dominated by the symposium on business development reported at length elsewhere, which proved a highly successful innovation. Another very interesting feature was the address on budget procedure by Louis F. Musil, treasurer of the Cities Service Company, New York.

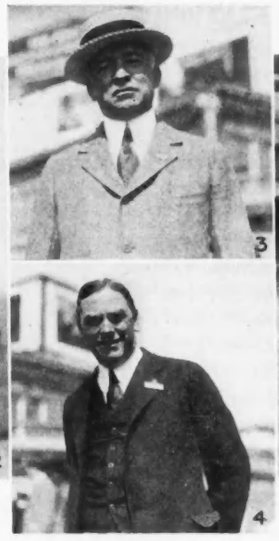
#### COMPANY EMPLOYEES' ORGANIZATION

A frank statement of the causes which have led to the present general indifference toward company section activity and the suggestion of changes which are considered necessary to insure even a promise of renewed interest from the report of the company employees' organizations committee, R. B. Grove, chairman. The indifference, it is stated, is due primarily to the fact that the company sections have no definite

No. 1—**E. W. Lloyd**, General Contract Agent Commonwealth Edison Company.

No. 2—**M. S. Sloan**, President Brooklyn Edison Company.

No. 3—**H. A. Wagner**, President Consolidated Gas, Electric Light & Power Co. of Baltimore.



No. 4—**William L. Goodwin**, Assistant to President Society for Electrical Development.

No. 5—**F. W. Smith**, Vice-President United Electric Light & Power Company.

No. 6—**Arthur Williams**, Commercial Manager New York Edison Company.

## Executives Who Are Always Outstanding Figures at N. E. L. A. Conventions

No. 1—**Alex Dow**, President Detroit Edison Company.

No. 2—**S. Z. Mitchell** (at left), President Electric Bond & Share Company. **Martin J. Insull** (at right), Vice-President Middle West Utilities Company.

No. 3—**M. R. Bump**, Chief Engineer H. L. Doherty & Company.

No. 4—**Guy E. Tripp** (at left), Chairman of the Board Westinghouse Electric & Manufacturing Co. **L. A. Osborne** (at right), Vice-President Westinghouse Electric & Manufacturing Co.

place in the national organization, that they have not been represented directly or indirectly on the national executive committee, that they have no official representation on national committees and that no specific work or responsibility is assigned to them by the constitution of the national organization.

To stimulate activity the following plan is suggested:

1. That the name of the committee be changed to "committee on company sections."
2. That the object of the committee be changed and that for future activities of the committee it be "To promote the organization of and foster the activities of company sections of the National Electric Light Association."
3. That the national organization chart be extended to include company sections, that a definite recognition of company sections be acknowledged by a statement in the constitution, and that company sections be granted automatic representation on state committees.
4. That provision be made on the program of the annual national convention for a meeting of those interested in company section activities.
5. That provision be made whereby Class B members shall be permitted to secure copies of individual national committee reports pertaining to subjects in which they are particularly interested.
6. That one copy of the entire *Proceedings* of each annual convention be sent free to each company section.

### Budget Procedure in Management Control

"The budget is too often used only to act as a check on dollars, and because of that reason its administration in many cases has been passed to that man or group of men who are able to check dollars very well, but on whom no recognized responsibility is vested for concurrence in or initiation of policies or programs which make it necessary for the dollars to be checked," declared Louis F. Musil, treasurer of the Cities Service Company, New York, in his address on "Budget Control" before the general and executive session on Wednesday. Mr. Musil pointed out that the most difficult task is the building in large enough numbers of executives who fully appreciate what is meant by, first, the acceptance and, second, the discharge of management responsibility. The difficulty is to pick from less experienced men those men with probable executive judgment and ability.

"The selection of future executives," said Mr. Musil, "may be made with more assurance and executives may be more successfully developed by the recognition and application of certain simple principles and procedure in organization and management. I call these budget principles and budget procedure." Mr. Musil pointed out that it is equally obvious that essentials of management are necessary to give the responsible executives full assurance that proper control is being exercised in operating problems as in the expenditure of capital funds which have for a long time been on a budget basis. "Every individual," he says, "who is charged with the responsibility of supervising the expenditure of human energy or capital should be required to predetermine the results to be obtained."

Mr. Musil submitted the following fundamentals which must be incorporated in any budget system:

1. The executive must recognize that his function is to create and enforce policies rather than to work out the problems resulting from such policies. If the expected results of policies laid down are predicted and mutually accepted, there will be little question in determining their merit or in determining the changes that may be necessary.
2. The executive must have knowledge of the control which is exercised by every individual in his organization to whom he subdivides responsibility. He must give evidence as to his knowledge of that control or the lack of that control and reward all individuals accordingly.
3. Individual merit can better be gaged by comparing a man's results with an accepted estimate by him of his future performance than by comparing his results with the results of some other individual.
4. It is therefore necessary for each individual in the order of his responsibility to recognize the necessity of adopting some common system of estimating the possibilities ahead of him.
5. Each individual must recognize the necessity of making his own estimate of what he is going to do and how he is going to do it before he or his associates or his executives can concede his qualifications or expect a full measure of results.
6. Each individual must further recognize that, through such a system, by the constant comparison of results with expectations, the leaks resulting from human omission and human judgment can most effectively be minimized.

### Membership

The report of the membership committee, Walter Neumuller chairman, showed slight gains during the year in each class. The number of new members was large but was for the most part offset by cancellations. There were on April 30, 1922, 11,029 members, of which 1,134 were in class A and 8,110 in class B, the remainder being in the other six groups.

## Third General and Executive Session

### W. S. Murray Refuses to Retract Views on Ontario Hydro System—Attorney General Daugherty Favors Customer Ownership

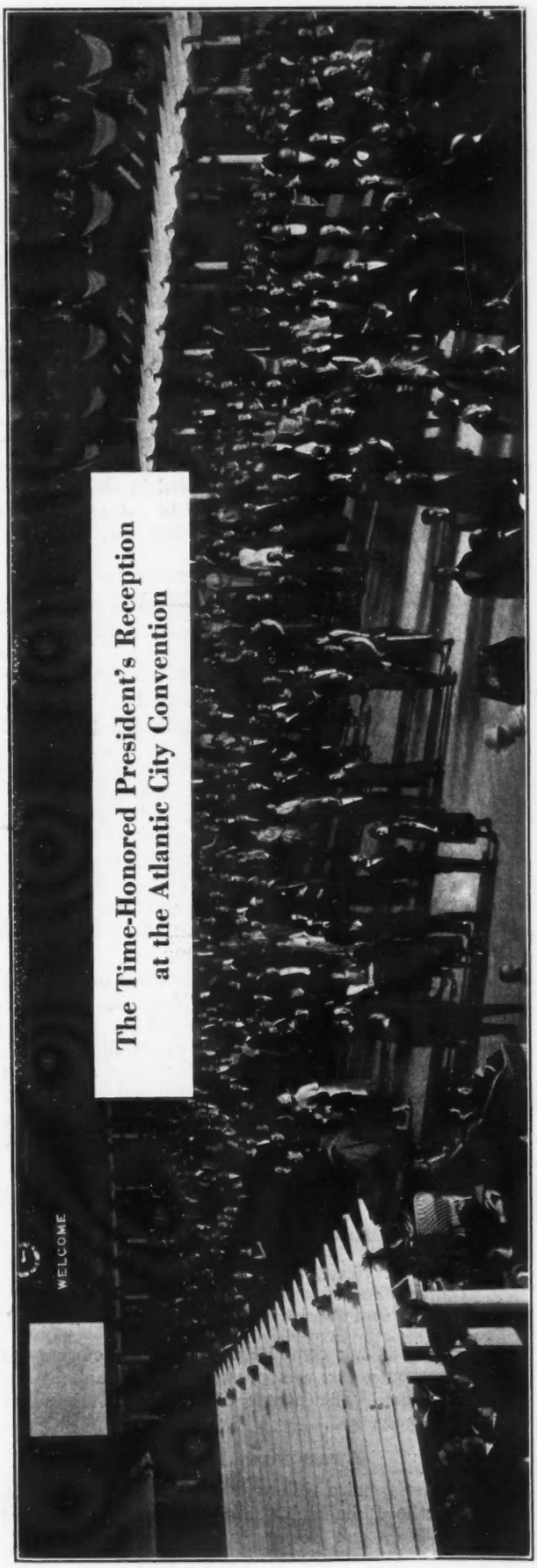
CARL D. JACKSON'S address, elsewhere reported, and W. S. Murray's emphatic refusal to retract his statements concerning the false economy of the Ontario Hydro-Electric Commission's system at the telegraphed request of a Hamilton (Ontario) newspaper marked Thursday's sessions.

### Great Saving Made by Insurance Companies

Typifying the value of association work, the savings effected for the industry through the activities of the insurance committee, headed by S. E. Wolff, are especially noteworthy. On March 3, 1922, the insurance interests notified the association's committee that they would grant an increase in differential, making the same 25 per cent on liability, property damage and collision rates, effective as of March 1, 1922, on electric trucks. The actual saving will not amount to 25 per cent, however, because the insurance companies continue to rate electric trucks upon the experience of the gasoline truck. The net saving amounts to 16⅔ per cent.

On April 28, 1922, the insurance interests also notified the association's committee that they had granted a reduction in fire, theft and transportation rates amounting to about 33⅓ per cent, effective as of May 1, 1922. Inasmuch as the insurance interests have not classified the experience of the electric truck with that of the gasoline truck in respect to fire, theft and transportation rates, this reduction of 33⅓ per cent will be actual. According to the compilations made by the committee, this will result in reductions on electric truck insurance ranging from 20 per cent to 52 per cent.

Feeling that central-station companies were entitled to a reduction in their fire insurance costs, the committee entered into active and exhaustive negotations




The Time-Honored President's Reception at the Atlantic City Convention

with the fire insurance companies, seeking relief. As a result of this work the Central Traction and Lighting Bureau formulated and promulgated schedules for the rating of properties to rating bureaus and associations of underwriters doing business in the United States. The general adoption of these schedules must await the action of the insurance companies and regulatory bodies in the several states in which they must be filed.

At a convention of insurance interests held last September a resolution was passed to the effect that it was just and reasonable to expect a downward revision of rates for fire insurance on stations and substations. Based upon this commitment and other authentic assurances, it was the expectation of the committee that the promised reduction of rates would be made effective by Jan. 1, 1922, from a rate-making body, but lower rates have not been officially promulgated yet.

### Relations with Savings Banks

Since the first of the year the committee on relations with savings banks, M. S. Sloan chairman, has been functioning. Its purpose is to obtain state legislation permitting savings banks and trust funds to invest in prime electric light and power company securities. The matter was presented to the National Conference of Mutual Savings Banks, and a joint committee was appointed. It was decided first to press for legislation in New York State, and comparative studies were made. Railroad bonds were taken as the gage. The data developed by the committee showed a total of $5,000,000,000 invested in electric light and power securities, about half of which is in bonds and notes. About 1,450,000 individuals have invested in these securities. Of the bonds insurance companies own approximately $300,000,000, and the 30,000 banks of the country have invested $1,700,000,000 in public utility funds. The report further showed the revenue, capacity and output growth of the industry.

In comparing railroad and public utility bonds fifty prime railroad and twenty-four prime electric light and power company bonds were chosen. The railroad securities totaled $1,001,700,000 and those of the utilities $714,600,000. The average interest rate paid by the railroads was 5½ per cent and by the utilities 4.23 per cent. The railroad earned their interest 2.4 times against 4.7 times for the utilities. The average quoted price of the railroad securities was 75.89 and of the utilities 92.25, while the yield on the former was 5.80 per cent against 5.86 per cent on the latter. Another index of safety was given which showed that 0.84 per cent of all railroad securities were in default, while only 0.14 per cent of power and light securities were defective.

Already twelve states permit investment of savings or trust funds in utility securities, and the effort now is to obtain similar action in the other states. For political reasons New York was omitted last year.

### Customer Ownership

That conditions during the past year have become more favorable to the sale of public utility securities was pointed out by the report of the customer ownership committee, John M. Gilchrist chairman. The companies which have gone out vigorously to sell securities to their customers have met with better results than they expected. More thought by a larger number of people has been given to the subject, and this had led

to broader and deeper consideration as to the general financial requirements which will attend the public utility business in the future and to the great necessity as well as the great advantages of financing by the sale of stock to customers. The conclusion has been definitely arrived at that customer ownership is not to be looked upon as a war measure destined to fade out with the return of normal conditions, but from a financing standpoint alone will become more and more important each year in the future. The committee directed much effort toward encouraging customer ownership among the member companies. In addition to its personal work communications were sent out during the year explaining what had been done and offering assistance to companies in getting campaigns started.

For the guidance of member companies the committee endeavored to collect in its report as complete data as possible from as large a number of companies engaged in this kind of selling as could be induced to make full reports of their activities. While information was gathered during the year indicating that more than 200 companies are engaged in the sale of securities to customers, full information was received from a little less than half this number. From these statistics the following interesting facts were learned:

The eighty-four companies reporting show that approximately 570,000 shares have been sold during the year. The ratio of total stockholders to total customers for all of the companies is one to seventeen. The average purchase for all the companies under the customer-ownership plan is seven shares per stockholder.

Selling cost per share was as high as $9 in one instance, but the average for the thirty-five companies was $4.30. One large company has been able to reduce its selling cost $1 per share in the last year. In the case of two large companies the cost has been reduced to 94 cents and 70 cents per share. These figures include all advertising expenses and commissions to salesmen.

Although the committee was unanimous in the belief that this form of financing is sound and desirable from all points, there is great danger, it thought, in hurrying into financial plans which have not been well worked out.

An address by Haley Fiske, president of the Metropolitan Life Insurance Company, on "Light and Power Securities as Investments for Life Insurance Companies," was very well received. Mr. Fiske's address will be printed in abstract in an early issue of the ELECTRICAL WORLD.

### AMERICAN AND CANADIAN UTILITIES COMPARED

W. S. Murray, in speaking of his report on the Hydro-Electric Power Commission of Ontario, recently published by the National Electric Light Association, said that he had nothing to add to or subtract from the conclusion he then drew. The accuracy of his statement to the effect that electric power is being furnished at less cost to the people on the American side than on the Canadian side of the Niagara River was questioned by the Hamilton (Ontario) *Spectator*. In a telegram to the convention that paper invited Mr. Murray to retract the statement in fairness to the communities of the Canadian Niagara district and the power commissions and companies of Ontario. Mr. Murray showed how the industries in Canada are discriminated against by the Hydro-Electric Power Commission in favor of the residence consumer and voter. He maintained that there was nothing to retract and that the facts show that power supplied by the privately owned electric utilities of the United States is more adequate, more reliable and cheaper than power supplied from the government owned and controlled system of the Hydro-Electric Power Commission of Ontario.

### SIMPLIFIED PRACTICE

William A. Durgin, representative of the Department of Commerce, spoke of the simplified practice which the department is offering as an aid in stabilizing American business and fortifying the American living standard. The Department of Commerce, he said, is interested in the application of the general principle—the elimination of the waste now incident to excess stock and investment, of the slowing of repetitive production, of decreased turnover, of absence of interchangeability, of excessive cost of repair and maintenance and of the handicap of American products in the foreign field. He suggested that if the National Electric Light Association was interested in the movement it appoint a small working group to act as a contact committee to the Department of Commerce.

### ATTORNEY-GENERAL OPPOSED TO GOVERNMENT OWNERSHIP

Although unable to be present at the convention because of pressure of official business, Harry M. Daugherty, Attorney-General of the United States, sent his speech to be read. In it he traced the marvelous growth of the electric light and power industry and showed how great an investment it now represents and how large a number of stockholders are interested in its success. "Regardless of class or color or means, more money belonging to the people," the Attorney-General said, "is invested in the utilities represented in the electrical industry than in any other utility in the world, except the steam railroads. This is the character of public ownership, I am frank to say, of which I am in favor. I am not in favor of political, governmental or municipal ownership."

"The electric light and power companies of the country are publicly owned," he said, "for they have more than 1,600,000 security holders among the citizens of this country. That is true public ownership, with the incentive of private development, investment and management, under fair public regulation, and it is preferable to the political ownership and political management which always follow where the municipality or the government owns a public utility."

## Fourth General and Executive Session

### Rural Service, Water-Power Development, Lamps, Technical Advice, Electrical Resources and Accident Prevention Reports

THE nominating committee's report on officers for the coming year was presented, as usual, at the closing session. The names of the new officers are printed on page 993.

### AWARDING OF PRIZES

The Doherty prize this year was awarded to W. H. Evans of the Philadelphia Electric Company for his paper on "More and Better Business."

The Billings prize was awarded to Walter H. Feldmann of the Consolidated Gas, Electric Light & Power Company of Baltimore for his paper on "The Electrification of Ice Plants."

### RURAL SERVICE

A comprehensive analysis of the farm service situation was presented in the report of the rural lines committee, of which G. C. Neff is chairman. There are 6,448,366 farms in the United States, six million of which are east of a north and south line drawn along the western boundary of the Dakotas. There are approximately two-thirds as many farm homes as there are residential customers now served with electric service. With an assumed population density allowing a possibility of three customers per mile of rural system, two million miles of distribution lines will be required to furnish service to these six million farms. As yet only a small percentage of these farms have electric service, and there has not been much uniformity in the method of supplying such service.

The committee has made a careful summary of the salient features of the rules governing rural service which are in effect in various states and has included these rules in an appendix to its report. There has been considerable controversy respecting what constitutes a rural consumer, but one fundamental to be kept in mind is that such consumers must not be called upon to pay more than their proportionate share of the cost of service and fixed costs.

The most common error met with in handling the factors entering in the cost of rural lines has been that of underestimation. Some have gone so far as to state that there are no overhead costs and that the bare cost of labor and material is the final answer.

Too much has been said about the use of cheap construction. On the basis of unit strength and maintenance costs rural lines are not different from those in the city or urban territory. In physical aspects the lines will probably carry less mechanical load than the city lines. The problem is therefore one of cutting out excess material to reduce costs without sacrificing strength and life.

In constructing rural lines proper regard should be given to maintenance costs and continuity of service. The maintenance cost of rural lines, owing to remote location and the poor condition of country roads during certain periods of the year, is many times the cost of maintaining distributing lines in urban districts, and consequently it is very important that rural lines shall be installed at as high a standard as that followed in urban districts, if not at an even higher one.

The successful development of rural electric service depends to some extent upon the amount of electrical energy that can be economically used by the farmer. The committee is making a study of the needs of the farmer and of the electrically driven equipment now available and hopes to assist in accelerating the development of additional machines suitable for farm service.

### PROGRESS IN WATER-POWER DEVELOPMENT

In its report to the convention the water-power committee cited the great developments that have taken place during the year and others that are in contemplation. The committee still has some differences with the Federal Power Commission over the interpretation of Regulation 16, especially with reference to the accrual of depreciation, because it does not take into account the vicissitudes of the business.

Chairman Franklin T. Griffith of Portland, Ore., reported anticipated expenditures on hydro-electric development aggregating $65,000,000 in 1922, as compared with total expenditures of $46,000,000 last year. Projects with a total installation of 744,000 kw. will be brought into operation this year. "Practically all developments now under construction are being made to meet increasing demands on operating utility companies," the report said, "and the cost figures given, representing as they do only the cost of the hydro-electric plants, do not cover a considerably larger sum expended and to be expanded in expansion of distribution and utilization systems."

Of the $46,000,000 spent for water-power development last year $38,000,000 was expended in the Pacific Coast States. The Pacific Coast is still maintaining its lead in hydro-electric development. "A great impetus would be given hydro-electric development," said Mr. Griffith, "if there could be inspired in the industry complete confidence in the feeling that hydro-electric development in the United States is to be made by private capital, subject to regulation, and with only reasonable governmental supervision. We are engaged in one of the most progressive of industries, one in which conservative

## Snapshots Up and Down the Boardwalk

No. 1.—**S. E. Doane,** Chief Engineer National Lamp Works of the General Electric Company.
No. 2—**W. L. Wadsworth,** Northern States Power Company.
No. 3—**C. E. Greenwood,** Edison Electric Illuminating Company.
No. 4—**H. N. McConnell,** Electric Bond & Share Company.
No. 5—**W. G. Kelly,** Commonwealth Edison Company.
No. 6—**L. C. Bradley,** Stone & Webster.
No. 7—**A. K. Baylor,** General Electric Company.

investors of the country are steadily gaining confidence. We firmly believe that under private initiative and with private capital the latent water powers of the United States can be brought to the service of man in the most efficient and economical manner. We believe that under sane regulation the interests of the consuming public can be and will be fully conserved."

### REPORT OF LAMP COMMITTEE

The lamp committee, Frank W. Smith chairman, reported that considerable progress had been made during the year in respect to standardization of 110, 115 and 120-volt lamps.

Just before the close of the year 1921 the committee advocated a campaign among member companies for "more and better lighting," which was indorsed by the national executive committee. This proposed activity developed into a broader movement than was originally considered, with the result that it was extended to include intensive business development in both the lighting and power fields.

### ELECTRICAL RESOURCES OF NATION

After telling briefly of the co-operative work with the engineers' branch of the army in obtaining data on the power resources of the electric light and power companies in the important industrial regions, the committee on the electrical resources of the nation, M. S. Sloan chairman, recommended that means be devised to bring about close co-operation between the organizations now compiling statistics of the industry. The committee pointed out that there are no means at present for establishing from year to year just what the electrical resources of the nation are. A comprehensive, exact and authoritative year book is therefore suggested, which will co-ordinate all that others are doing and combine these data with information obtained at first hand. In conclusion the committee recommended that the utilities should not wait for the state commissions to institute actions, but should themselves present to the community exhaustive demonstrations of their productive assets.

### TECHNICAL ADVISORY COMMITTEE

The technical advisory committee, Charles F. Scott chairman, in its report pointed out that technical work in the power industry concerns:

A. The present—operation; improving methods; determining best practice; improving appliances and methods for reliability and economy. This field is covered by the technical committees.

B. The future—research and development. A long-range outlook to the future; a study of larger problems; organized and co-ordinated research. This field was treated in a report by the technical advisory committee during the past year, in which a new policy of the association was proposed. It is expected that a conference on this subject between the public policy committee and the technical advisory committee may be held in the near future.

### ACCIDENT PREVENTION

In the comprehensive detailed report made by the accident prevention committee, Charles B. Scott chairman, there was discernible a note of disappointment that more attention had not been given to safety measures by member companies. The report was subdivided for detailed presentation into a number of parts, through all of which, in addition to the humanitarian motive, ran the thought of the economies that would result from safety work. The committee announced the institution of the Insull medal, given by Samuel Insull for award for specially commendable work in successful resuscitation.

An explanation of the proposed California water-power act was given in detail by Paul Downing of the Pacific Gas & Electric Company of San Francisco and a review of the work of the public policy sub-committee on industrial interference was presented by Paul Stenzer of the United Gas Improvement Company of Philadelphia.

The usual committee reports on resolutions and on memorials were presented by Arthur Williams of the New York Edison Company and W. H. Onken, Jr., of the ELECTRICAL WORLD respectively. The president's address was highly commended, and the convention, which in point of attendance was probably the largest ever held, was brought to a conclusion with a short address from the president-elect, Frank W. Smith.

## General Squier on "Wired Wireless"

AN ADDRESS by Gen. George O. Squier, Signal Corps, U. S. A., on the opportunities of electric light and power companies to win public good will by broadcasting entertainment and news over their circuits and through the lamp sockets attracted great interest at the session of the electrical apparatus committee. A report of General Squier's remarks will appear next week.

## New N. E. L. A. Film Makes Decided Hit

A NEW film entitled "Yours to Command" was displayed at the Atlantic City convention and was exceedingly well received. The film is designed to show the public the dominant part electricity now plays in the life of the average individual, the illustrations being based in this case upon the use of electricity in the motion-picture industry. The film opens with the statement that few people realize the influence of electrical service in modern life and announces that the picture then being shown would be impossible without such service. The production of motion pictures is illustrated, showing the equipment of the modern "movie" studio and a company actually engaged in producing a feature film. This is followed by pictures showing the mechanical details of developing and fixing negatives, the printing of positive films from the negatives and the method by which the finished film is projected upon the screen. Intimate views of the mechanism, all of which is electrically operated, are shown.

The film then shows how electricity is applied in lighting the streets through which one approaches the theater and the use of electricity in sign advertising with many of its applications in manufacturing, commercial and home life. In conclusion, a graphic portrayal is given of the ownership of the central-station industry by more than 1,600,000 holders of electric light and power securities, and the indirect ownership of millions of insurance-policy holders and bank depositors is also brought out. It is expected that this film will be even more successful than the earlier film of the N. E. L. A., entitled "Back of the Button," produced by the association a year ago.

# Industry Seeking Financial Aid and Good Will

## Public Policy Committee of the N.E.L.A. Touches on Vital Issues Confronting the Electric Public Utilities of the Country

THE public policy committee of the National Electric Light Association a year ago, in its report, was able to strike a note of optimism for the light and power industry, notwithstanding the serious situation consequent on post-war reconstruction and deflation that then obtained. Its report this year is reassuringly optimistic as may be judged from the following excerpts.

"Although we never doubted the ability of our industry to adapt itself to changed conditions and counted on inventive intelligence and suppleness of mind to vanquish the various problems as they arose," said S. Z. Mitchell, the chairman of the committee, "we are nevertheless heartened and encouraged by the remarkable stability of electric power and light utilities through the period of depression. Even now, with the country in the grip of a nation-wide coal strike, the example of our industry in continuing to supply 100 per cent service is most inspiring.

"In matters of public policy we are equally fortunate. Whether because of the inherent strength of our business, or the moderation shown in the conduct of our affairs, or the care with which the problems have been approached, the fact remains that the electric light and power companies of the country have been singularly free from reproach and are in high favor with the public. . . .

### COMMISSION REGULATION

"As an industry it has been our fixed policy to cooperate with the various public utility commissions to the end that regulation should be established on such a sound and equitable basis as to commend itself alike to the utilities and the public whom they serve. . . .

"There is no longer any doubt that in public service regulated monopoly is better for both the public and the investor than unregulated competition or state or municipal ownership. . . .

"Through the wide distribution of our securities and especially through customer ownership we have the much better form of direct public ownership and private operation under public supervision. . . .

"Although still in a process of evolution, regulation and control is now a permanent feature of our economic law. Manifestly it is still lacking in some of those elements of finality and precedent which have been developed in jurisprudence from the experience of ages; but it is none the less effective. Few reforms in government have ever been successfully or permanently established otherwise than step by step and by slow degrees. We should therefore in this formative period of regulation help evolve a system as perfect as possible. . . ."

### FINANCE

The problem of financing, according to the committee, transcends all others, for unless the industry is successful in raising about three-quarters of a billion dollars of new capital yearly, development will be seriously checked. In large measure the basis of its credit is the stability and adequacy of its earning power. Investment in public utilities cannot be amortized. Investors in effect purchase a transferable annuity. The regularity of the return on invested capital in good times and bad will determine the amount of money which can be obtained in return for this annual payment. By stabilizing distributable earnings credit will be stabilized and capital at reasonable cost more readily obtained, and the industry can give that efficient service to which the community is entitled and at lower rates than possible with a fluctuating and uncertain return. Too frequent changes in rates or riders on contracts to tide things over temporarily or to ward off insolvency, said the committee, are not in keeping with enlightened public policy. A liberal return on the value of utilities is essential not only to their prosperity but to the well-being also of the communities served.

While keeping the rates at all times fair and reasonable to the consumer, the commissions in the public interest should be sure to see that at least a fair return is accorded the investor. A rate slightly too low, while meaning little in dollars and cents to any particular consumer, may mean much when it comes to the question of dependable service. To restrict unreasonably the return is comparable to starving the horse that is expected to carry the heavy load.

A plea was made for a greater sale of junior securities, and for a rate which will amply safeguard the principal.

It is a wonderful tribute to the soundness of the electric public utility business as a whole, the report continued, when, flanked on all sides by widespread depression and pessimism, and during the most trying period of its existence, out of a total of approximately five billions invested, only a very small fraction of 1 per cent in the bonds were in default. In view of this showing, additional channels for funds should be available through banks, insurance companies, trustees of funds and other agencies seeking conservative investments.

### DEMOCRATIZATION OF THE INDUSTRY

As one of the outstanding factors of the electric light and power business, the committee called attention to the great impetus which has been given to the movement for customer ownership of securities. This movement, started years ago on the Pacific Coast, still continues to grow in popularity and strength, and today there are more than 1,600,000 holders of electric light and power securities. There is, in fact, today public ownership of utilities in the real and best sense of the word. The steadiness of the growth of customer ownership is the best warrant of its depth and permanence, and the readiness with which the users of electric service and the commissions have taken to this form of financing is a happy augury for the future. It has proved a great step forward in the establishment of enduring and sound public relations.

### WATER-POWER DEVELOPMENT AND INTERCONNECTION

The regulations now in effect with reference to the development of water power under the federal law are still in some respects unsatisfactory and unworkable. Conferences have been held with the Federal Power Commission over the accounting rules and the base for determining when amortization of investment should begin, and while no decision has been handed down, the committee is not without hope that the suggestions and recommendations of the association will serve as a basis for a workable settlement of this problem.

In the matter of water-power development the indus-

try must show some of its old-time vision and imagination. Even though engrossed with local business, it must not close its eyes to the nation and the nation's interests or to the questions, fundamental and vital, which in the end must be controlling, if there shall be national development and growth. The public has a right to insist that those water powers which are capable of economic development shall be utilized and that every effort shall be made to conserve our fuel supplies through the transmission and use of hydro-electric energy for power purposes now being wasted. On the other hand, it is not unreasonable to expect that the government's representatives will not retard this pioneering but will rather assist it through a liberal co-operative attitude.

As for interconnection, the advantages and economies resulting therefrom are already established and need no elucidation. Striking examples of interconnected systems are to be found in various sections of the country. Out of the experience gained in the operation of such systems, two outstanding facts appear: First, the service has been improved or maintained at the highest point of efficiency without the necessity for proportionately increased rates, and, second, ability to furnish service which otherwise would not be possible has resulted in increased demands with increased benefits to those who use the service. Thus, with the widening of interconnected zone networks, it becomes feasible to extend electric distribution systems into suburban and rural communities.

### ELECTRICITY ON THE FARM

There has been an increasing interest in rural-line extensions and eagerness on the part of power companies to develop this class of business wherever the earnings will permit. To those who have not yet taken up the matter the committee commended it most heartily. Nothing is more welcome to the farmers than electric service or contributes so much toward lightening the burden of their lives.

This is not the time to enlarge upon the limitless possibilities of electricity on the farm, the report went on, or on the obligation to give the farmer service. No nation such as ours is stronger than its agriculture, and outside of industrial centers nothing contributes so much to the wealth and stability of cities as growing and prosperous farm communities. Of the accuracy of this statement history furnishes abundant proof. Any movement, therefore, to build up the city at the expense of the farming community is short-sighted. It was with great pleasure that the committee noted the larger views taken of this matter as exemplified in the growing popularity of and faith in state regulation as contrasted with so-called municipal "home rule." Under the former the extension of electric service to rural communities is encouraged, while under the latter such service, except at prohibitive cost, is often denied the farmer, to the detriment of the state.

### STATE BUREAUS OF PUBLIC INFORMATION

The one supreme danger that threatens the permanency and credit of the electrical industry is the dissemination of false statements or erroneous information by misinformed or ambitious demagogues. To overcome popular misconceptions, prejudice and error, the truth must be published and circulated widely. The companies have taken the people into partnership with them through stock sales. The people should as partners have a clear knowledge of the problems and affairs of the company. This knowledge should not come from those who exploit the industry for their own selfish ends, but at first hand from the source. For this purpose there have been formed in twenty-five states committees on public utility information in charge of men who are well informed and of good judgment.

Thus far the work has been well done, and a change in the attitude toward public utilities is discernible. So important is this work that the public policy committee had no hesitancy in suggesting to utilities in states not already possessing such committees on public utility information that they align themselves definitely and squarely with the movement. The electric companies seek only to publish the truth and to correct certain economic fallacies.

### THE OPPORTUNITIES BEFORE THE INDUSTRY

"The world war, with its incalculable waste and havoc and financial disturbance," concluded the committee, "postponed for a few years the development of the electric light and power industry at its accustomed and normally ever-increasing rate. But the war and the war's aftermath are, in America, receding into the past, and our industry is faced with an imperative demand for electrical development of great magnitude. National prosperity will soon once more prevail, and prosperity brings with it problems as great as those of troublous times. We must be ready to solve them. To our industry they will present themselves in the main as financial ones. To carry out the program of electrical development which foresight dictates it is necessary to obtain new capital in the sum of approximately three-quarters of a billion dollars a year for the next five years. In accomplishing this huge task the aid of the people we serve is a most important factor. The public policy committee is glad to note that the old indifferent attitude is rapidly giving way and that there is clearly to be seen on every hand a greater readiness to invest in the securities of the industry. With the growth of public friendship and well-deserved confidence it will be placed beyond peradventure that the people of America are to be adequately and efficiently supplied with the electric light and power so essential to their progress and their welfare."

## Wonderful Demonstration Given of Transcontinental Telephony

TWO members of the association addressed the convention by long-distance telephone Thursday night from San Francisco. Bancroft Gherardi, vice-president of the American Telephone & Telegraph Company, acted as chairman of the long-distance meeting at the Atlantic City end. Those who addressed the convention from a meeting at San Francisco were R. H. Ballard of Los Angeles, vice-president of the Southern California Edison Company and former president of the association, and John A. Britton of San Francisco, vice-president of the Pacific Gas & Electric Company. J. C. Nowell, vice-president of the Pacific Telephone & Telegraph Company, also conveyed his greetings to the Atlantic City convention from San Francisco.

The addresses made in San Francisco were plainly audible to every one in the convention hall through the use of amplifiers, and the speakers in California expressed their thanks for the applause which came to their ears across the continent.

# Some Post-War Problems of the Utilities*

## Need of Legislation to Give Utility Securities a Wider Market — Advantages of Customer Ownership—Trend in Legislation and Regulation

BY CARL D. JACKSON
President National Association of Railway and Utilities Commissioners

ABNORMAL war conditions directly affecting public utility service and finance served to bring home clearly to the country fundamental economic laws. The public came more clearly to understand the importance of all kinds of public utility service in respect to every phase of daily life and recognized that adequate service could be obtained only through fair treatment of investors' capital dedicated to public use. The war period also served to emphasize the short-sighted financial policy of many utility corporations and the necessity for broader and more far-seeing and elastic policies in this respect if the utilities are to meet the full measure of public obligation on their part. Difficult as was the situation for many utilities during the war period, it is plain that post-war conditions have brought in their wake problems that must be met wisely if future progress is not to be seriously retarded. A greatly increasing demand for utility service is an outstanding characteristic of our economic development. In the electrical field alone the possibilities of development—the absolute necessity of such development—is clearly seen and is as yet immeasurable, so great are the possibilities. The inventive genius, the spirit of American enterprise, can be retarded in this field only by short-sighted public policy. Regulation in the public interest, jealous of the rights of the public on the one hand and obligated to give fair treatment to utility interests on the other hand, can be taken as assured.

CARL D. JACKSON

### HARM OF TAX-EXEMPT SECURITIES

The capital requirements of which I shall shortly speak, which must be met if we are to reap the economic benefits in sight, are not only very great in amount, but the supply of capital is more or less controlled and curtailed by certain governmental policies calculated to affect very adversely not only the utility industry but all productive industry in the country. I refer, of course, to the tremendous flood of tax-exempt securities already issued and being issued in increased magnitude.

The public utility requirements in the immediate future for gas, electric light and power, telephone facilities and street railways are estimated to be about $850,000,000 annually. Steam railroads should have $1,000,000,000 annually. It is estimated that not more than $500,000,000 may be secured from institutions such as banks, trust companies, insurance companies, etc. After making allowances for all possible sources of capital, the estimate is that more than $1,000,000,000 will be required from the individual investors if the utilities are to meet the service requirements the public has a right to demand, and unless the individual investor is willing to supply this capital, necessary development cannot take place. Hydro-electric development will demand an increasing amount of capital if the country is to reap the benefits of this source of energy.

The present federal tax laws must necessarily handicap the securing of capital upon the most reasonable rates of interest, but the issuance of tax-exempt securities has deprived every industry, including the public utility industry, of a very important source of capital, and such capital as is now thus secured from the individual investor is generally secured on onerous terms.

The amount of wholly tax-exempt issues outstanding on Jan. 1 of this year is variously estimated, but very conservatively placed by Secretary Mellon at $10,660,000,000. This includes the wholly tax-exempt 3½ per cent Liberty bonds, amounting to $1,500,000,000. By far the larger proportion consists of municipal or state obligations. Unconsciously and without knowing the effects of the tax-exempt policy, we are rapidly building up in this country a tax-free privileged class. Tax exemption is not only economically unsound, it is un-American and undemocratic and wholly foreign to our institutions.

### PUBLIC UTILITY SECURITIES AS PREFERRED INVESTMENTS

The unquestioned desirability of a large volume of public utility securities for permanent investment is generally recognized. Such investments in the utility field, however, have not in many states received the full legal recognition to which they are entitled because of the highly important public function they are performing and the solid nature of the security offered. The system of regulation now in force in most states entitles the utility industry to the same recognition accorded the older branch of utility service represented by steam roads.

There are thirty-one states in which there appears to be an entire absence of statutory authorization to savings banks for investment in gas, electric, telephone or electric railway securities, and two others in which authorization is lacking except for electric railways. The history of public utility securities entitles them to confidence. Practically all such issues are supervised by state agencies of responsible authority. The utilities are essential to every-day modern life. The welfare and progress of the country depend upon their encouragement and development. Archaic statutes enacted to meet situations of half a century ago should give way to non-discriminatory provisions recognizing the public interest in utility investment and placing these public utilities on a fair competitive basis in the money market.

Public utilities must have capital if they are adequately to perform the service that the future will demand. Every legitimate source for this necessary capital should be open to the public utilities on fair

*Abstract of address before the National Electric Light Association at Atlantic City, N. J., May 18, 1922.

terms without discrimination. A substantial portion of such capital will come directly from the consumer himself.

Customer ownership should be encouraged in every way, not entirely because it is a source of capital, but because it constitutes the simplest form of actual public ownership and because the reciprocal responsibilities of customers and utility management will thus be emphasized. While such direct ownership will tend to enlighten public policy, it is also certain to impress emphatically on utility management the outstanding necessity for the best public service. On one hand, you will have public ownership and on the other hand public service.

### PUBLIC VERSUS GOVERNMENT OWNERSHIP

The tendency is, I believe, toward public ownership rather than government ownership. Such experience as we have had of direct government control and operation has left an indelible impress on the public mind of an unfavorable nature. It would be most unfortunate and disastrous to the public interest were the country to be deprived of individual initiative and enterprise that is prepared to accomplish in the future in the electrical world still more wonderful results than it has accomplished in the past. Government was not established and was not intended to be formed for the purpose of great industrial undertakings, demanding the highest skill, efficiency and economy, knowing neither municipal nor state lines. Wise and fair regulation will encourage development and operating economies without stifling enterprise and at the same time will give to the public the full benefit of reasonable rates. The acceptance of high ideals in the performance of the great public service on the part of utilities will be an assurance against such a calamity as government ownership.

### IMPORTANCE OF INTERCONNECTION

The problem is that of bringing the cheaply generated energy of the more efficient plants to the ultimate consumer in the most economical manner. It is being solved through the growing network of interconnecting lines. Its effect is quite evident in my own state—Wisconsin. There a number of smaller communities own their own distributing system or generating plant, or both, generally established at a time when the larger and more economic sources of energy were not available. In 1915 only twenty-eight purchased energy from the large private sources of supply and seventy-nine generated their own energy. At present sixty-six are purchasing energy and only twenty-nine developing it. In the meantime many of these municipal plants have been sold and the municipalities have gone out of government operation.

### TREND OF LEGISLATION

The tendency during abnormal times growing out of the war was to seek a remedy for every unfavorable condition through legislation. There has been an insistent demand for new boards or bureaus to deal with almost every phase of activity. The return to normal will be marked by willingness to give freer reign to the working out of economic laws which in the end must control. This war spirit is exemplified by the habit of calling for legislation to cure every supposed injustice, to interfere with established machinery, and to fix rules of procedure or evidence. When such attempts are aimed at making ineffective the most fundamental principles of constitutional right and protection, the seriousness of the situation becomes apparent to everybody. Commissions, like other boards or administrative bodies, are established in compliance and to comply with the law and constitutional principles. When, as sometimes happens, serious questions arise as to the proper course of administration, such boards or commissions should welcome judicial review and interpretation, and if in the course of an orderly procedure in court for the protection of constitutional rights it shall appear to interested parties that technical or unreasonable rules of evidence are applied, believed to be prejudical, the remedy is not by legislation but by having such rules of evidence duly passed upon by the courts after fair presentation. This government, our institutions, our most highly prized rights, are dependent upon the constitutional and legal provisions for the protection of everybody. Any attempt to change or interfere with the orderly and due processes of courts in maintaining such rights is aimed at the liberties of the people.

Some post-war problems will arise from time to time out of the gradually lowering level of cost from the peak of the war period. The consuming public has not taken the trouble to ascertain that the cost of utility service in many lines has been but little increased over the cost in the pre-war period and has never been increased in proportion to the general price-level increase. It is estimated that the average increased cost of electrical energy to the consumer throughout the country did not reach the general level of pre-war times. The principal assurance therefore in such fields lies in new efficiencies and economies, the benefit of which will be shared by the public. For such efficiencies the utility is entitled to its share of reward.

### REGULATION

Problems of regulation are coming to be better understood, and commissions and courts are breaking away from such doctrines as theoretical loss in value through so-called depreciation and the arbitrary cutting down of legitimate investment for the purpose of meeting a theoretical loss in value having no relation to cost of retirement and that will never occur, which cutting down of investment can only add to any possible difficulty of meeting any loss in retirements if it should occur. It is to be hoped that the uniform system of accounts proposed by the National Association of Railway and Utility Commissioners may be generally adopted and become the basis of a more uniform and fair treatment of such questions. Another error that is sometimes made is in treating "investment" as though it were synonymous with "original cost," the latter term meaning original cost of physical property still existing. Often "investment" and "original cost" may mean the same thing, but sometimes they may be materially different. Investment may be absolutely necessary, especially in the earlier years of enterprise which represents something beside the original cost of tangible property. Most of the commissions have recognized this fact, though no general rule seems to be possible, and the commissions, it seems to me, rightly scrutinize claims of this nature with care, recognizing such claims only where equity pretty clearly calls for that treatment.

# Development of the Electrical Business

## *A Symposium by*

**Henry L. Doherty**
*President*
*Henry L. Doherty & Company*

**W. W. Freeman**
*President Society for Electrical Development, Inc., and*
*President Union Gas & Electric Company, Cincinnati*

**Guy E. Tripp**
*Chairman of the Board*
*Westinghouse Electric & Manufacturing Company*

**Farquson Johnson**
*Executive Manager*
*National Association of Electrical Contractors and Dealers*

**W. E. Robertson**
*General Manager*
*Robertson-Cataract Electric Company, Buffalo*

**H. A. Lane**
*Director*
*Joint Committee for Business Development, N. E. L. A.*

ONE of the outstanding features of the forty-fifth convention of the National Electric Light Association at Atlantic City this week was the symposium on business development held on Wednesday morning. To this symposium all the branches of the industry were invited to contribute, and representatives appeared as follows: For the electric light and power interests, Henry L. Doherty, president Henry L. Doherty & Company, New York; representing the electrical manufacturers, Guy E. Tripp, chairman of the board, Westinghouse Electric & Manufacturing Company. The electrical supply jobber was ably represented by W. E. Robertson, general manager of the Robertson-Cataract Electric Company, Buffalo. James R. Strong, president of the National Association of Electrical Contractors and Dealers, was unavoidably detained, and Farquson Johnson, executive manager of the association, spoke in his stead. The Society for Electrical Development was represented by W. W. Freeman, past-president of the National Electric Light Association and president of the society. H. A. Lane, director of the joint committee for business development, spoke for the organization which is expected to carry on the work.

Owing to a lack of understanding on the part of the industry as to just what sort of work the joint committee for business development is to take up, it was emphasized that first and foremost there would be no campaign, but a continued and sustained effort spreading over a number of years to interest all branches of the industry in co-operatively working for a greater electrical development of the country; second, that the purpose was not to establish a big machine at a central point to carry out a plan, but to get local interest back of the movement through the formation of co-operative leagues in every large city. In this work the central-station company is expected to take a leading part.

### JOINT SALES EFFORT NEEDED

Quoting the oft-repeated statement that "electricity is only in its infancy," Henry L. Doherty said the truth of the matter is that electricity is today the best developed science we have, but the science has been developed in all of its various stages so rapidly that it can truthfully be said that the applications of electricity in relation to its opportunities are still in their infancy. He intimated that what is needed is joint sales efforts and still more joint sales efforts, because it will be true for many years to come that the engineers can point out actually developed apparatus for the application of electricity faster than the sales efforts of the industry can realize upon the opportunities.

Every sound business proposition, he said, is based upon the fact that it supplies some service or commodity to its customer at far less than its true value. There are natural limits that fix prices. The lower price is limited by the cost of production. Nothing can be sold permanently at a price less than its cost of production. The higher price is fixed by the fact that nothing can be sold above its value to the user. Between these limits the price must lie, and almost universally the price is fixed only slightly above the cost of production, regardless of how great the value may be to the user.

Big business, said Mr. Doherty, cannot haggle and bargain, but must serve all at a published schedule and serve all at the lowest possible cost. We build, he said, a water-power plant in some sparsely settled section of the country and carry energy to the near-by market, supplying electricity in many places where central-station service has never been had before. Perhaps many of the power users in the district have been generating power at a cost of five or six times what is charged them, and the users start out with a dividend from business of perhaps five-sixths of their entire previous costs for power. Yet, said Mr. Doherty, these users who have received such huge benefits later show a desire to quarrel with the central station if it happens to make any profit out of the relatively small payments it receives from the sale of energy, in the light of the value of the service to the public.

Mr. Doherty expressed the opinion that the great business successes of the country have generally been made by the men who have entirely lost sight of the money profits they would make out of business. Success has largely been achieved by the men who have loved the game. All men probably have sufficient altruism in their make-up, Mr. Doherty continued, to prefer to sell something valuable to the buyer rather than something that has no value, and in his opinion every salesman can work better if he thoroughly appreciates the fact that he is selling something to the buyer which is vastly more valuable to that buyer than the amount he pays for it.

From the standpoint of the central-station company whose object it is to get the best appliances into the hands of its customers and which is not interested in

competitive selling, Mr. Doherty contended that the utilities are in every instance doing vastly more in their salesmanship to benefit the public than the benefit which is realized by the utilities. The greater the development of the use of electricity the more possible it becomes to serve sparsely settled districts, so that intensfied salesmanship is cumulative in its good effect. If electric service is used for any purpose in one house or one factory, said Mr. Doherty, why stop until it is used in every other home and every other factory? Some day, he said, a study will be made of every bit of human labor that is done with the idea of applying electricity as an aid thereto, and he expressed the hope that the inauguration of the joint sales effort would soon bring about that consummation.

### VIEWPOINT OF MANUFACTURER

Guy E. Tripp, chairman of the board of the Westinghouse Electric & Manufacturing Company, outlined very clearly the work to be done by the manufacturer, jobber and contractor-dealer and how that work should dovetail with the work of the central station. In General Tripp's estimation whatever is the soundest method of distribution will in the end lead the procession, and the relative character of public service which is rendered in the development of the central-station field forms one of the best tests. The complete address of General Tripp is printed elsewhere in this issue.

### THE JOBBERS ANXIOUS TO CO-OPERATE

W. E. Robertson of Buffalo expressed the appreciation of the jobbers for the appointment this year, by invitation of the N. E. L. A., of one of their number as a member of the executive committee of the central-station organization. This is the first time that such action has been taken and indicates the growing recognition of the interdependence of the industry's different branches. "Instead of being overawed by central-station men, I have been overwhelmed by their consideration," declared the speaker. He then expressed the appreciation of the jobbers of the prospective attendance of President Bump of the N. E. L. A. at the forthcoming Hot Springs convention of the Electric Supply Jobbers' Association. This will be the first time that a president of the National Electric Light Association has adressed that branch of the industry.

Mr. Robertson said that the jobbers' ability to help in creating the larger market for electrical service and equipment is twofold, first, through the co-operative effort in larger cities of jobbers as important factors in distribution, working with the manufacturers' representatives, contractor-dealers and central stations in putting on campaigns such as the "home electric," electric shows, special drives for seasonal devices and similar movements.

### CONTRACTOR-DEALERS INDORSE THE MOVEMENT

The executive manager of the National Association of Electrical Contractors and Dealers, F. Johnson, said that the joint committee on business development has the unqualified indorsement of the contractors' association. An earnest and honest effort has been made to create a spirit of enthusiasm for the movement among the contractor-dealers of the country. So far only slight success has attended the efforts, and this Mr. Johnson attributed to the fact that central-station companies and electrical contractors are about as close together in co-operation as capital and labor. This, he said, was a mistake because their interests are the same. Both should face the situation fairly and squarely, and they should work together for the public and for the good of all.

### PROGRAM ESPECIALLY APPROPRIATE NOW

W. W. Freeman, speaking as president of the Society for Electrical Development, pledged the unqualified support and participation of that organization in the movement. From his experience as a central-station executive, Mr. Freeman said that it was obligatory upon the public utilities to serve and expand their facilities to meet the growing demands of the public. It was also expedient from a financial point of view that the development be intensive so that the public utility might realize the largest income from its investment. Unlike other businesses, the turnover in the electric light and power industry is very small, and in the interests of stability every effort should be made to increase it. Time was, he said, when a revenue of $3 per capita was considered fair, but today a revenue of $13 per capita is no more satisfactory than the smaller sum was in former days.

### THE "ELECTRIFY AMERICA" MOVEMENT

H. A. Lane, director of the joint committee for business development, in outlining the plans for the movement, said:

"In the movement to electrify America it has been very aptly said that unified effort could be very well expressed as 'Work together and win together.' The financiers of the country are optimistic in their views as to the future of business. With this optimistic view it behooves all branches not only of the electrical industry but of every kind of business to lay plans to revive now dormant business into very aggressive action. Because the electrical industry is of such immense proportions, the American public perhaps looks, at least in a measure, to this industry to lead the way and to express its faith in the future of America. Now that the price of money has decreased, the leaders of the electrical industry feel that it is the proper time to undertake boldly the resumption of normal and of greatly increased business activity."

This note was first sounded by President Bump when he invited representatives of the electrical organizations to a meeting early in the year. The suggestion made by him was most heartily indorsed, and as a result of the meeting the joint committee for business development was created. The personnel of this joint committee includes representatives not only of the national electrical associations and those affiliated with them but of individual business organizations. In the formation of this joint committee the main purpose was to crystallize all past efforts into a well-defined program which would have for its ultimate purpose the initiation of local business development activities in every city.

The joint committee is to act as the clearing house for activities so that from the experience of others local interests may take advantage of what has been accomplished and duplicate in a measure the achievements of other towns. "By working together we will win together," said Mr. Lane, "and the electrical industry as well as all other branches of business will be stimulated and normal conditions restored."

# The Manufacturer, Jobber and Contractor-Dealer*

## How the Functions of One Dovetail Into the Others', and the Relation Each Bears to the Electric Light and Power Industry

BY GUY E. TRIPP
Chairman of the Board
Westinghouse Electric & Manufacturing Company

I HESITATE to speak at all upon the subject of developing the business of the electric light and power industry in the presence of this body of experts, and I resolutely decline to talk about specific or detailed methods, because I realize that my only safeguard is to deal in generalities. There are at least two kinds of generalities available to me—one way being to use my ingenuity in stating in as many ways as possible that we all ought to get together and push the business, and the other way being to select one or two general problems of the industry and tell you what I think about them. The one which most interests me is the relation of the electric light and power company, the manufacturer, the jobber and the dealer. This particular subject is a complicated and delicate one, notwithstanding that the field of endeavor of each of the parties is theoretically clear and the end to be achieved is agreed upon on all sides. I will not risk myself so far as to discuss the ethics of this relationship, but I am going to say a word or two about its action and reaction in the field of development of the business of the electric light and power company.

GUY E. TRIPP

### EVOLUTION OF THE JOBBER

In the early days of electricity the inventor-manufacturer covered the whole field, just in the same manner that steamboat and steam-locomotive inventor-manufacturers covered their field; that is to say, they built the machines and they operated them. The rapid growth of the electric light and street-railway business into a public necessity soon relegated the manufacturer in the main to his own job because both jobs got too much for him. Up to this time there was no demand for the work of the jobber, and the two other parties had the field to themselves. It was only when the people in the electrical industry, both the manufacturer and the electric light and power company, awoke to their shortcomings as business developers that a job was made for the jobber.

The life of the pioneer jobber was not always happy in those days when electric light companies followed the practice of furnishing free lamp renewals and cut prices on other supplies—a method of lottery management which defied accurate accounting on the part of the utility and furnished a kind of competition which drove the jobber to despair. But the jobber lived on, not because he was of much account as a load builder for the light or railway company, but for the reason that he was a convenient warehouse for the company itself. He carried supplies which could be had at a moment's notice, and that was worth a good deal.

It has been only in very recent years that the jobber has had his opportunity as an important ally of the utility in the field of new-business development, and it is only in a comparatively recent time that the electric light and power companies have recognized the great value of the jobber and dealer in the capacity of load builders. The general position of these interests in the electrical trade, so far as it has been developed, is a perfectly logical result of the evolution of the business. Of course, the lines of endeavor are not clearly drawn. Manufacturers are still in the field as operators of public utilities, and they are also in the jobbing field, and to a lesser degree some light and power companies are still in the dealer field, although they have kept out of the domain of the manufacturer.

For the purpose of a discussion of business getting it makes little difference whether a public utility is operated by an electrical manufacturer or not, but the policy of the manufacturer or the light and power company in entering the dealer business may produce an effect which may either increase or decrease the rate of the growth of the light and power company's load.

The relation of the jobber to the dealer is a most important factor in the situation, and I shall refer to it a little further along in this paper. I mention it now only for the purpose of giving notice that I am going to place upon the jobber some responsibility for the dealer, and also to charge the dealer to the account of the jobber as an asset.

### ATTITUDE OF MANUFACTURER TO JOBBER

But first I ask your attention to the attitude of the manufacturer toward the jobber, and here there are a number of features involved. What the manufacturer wants is a wide distribution of his goods, and where in any locality this is accomplished by dealing through independent jobbing houses, no better results being possible of attainment by investing his money in the creation of new jobbing houses or by the purchase of existing ones, the manufacturer, since he ordinarily has other uses for his money, will probably not wish to make the investment.

There is, however, one complication which I see no way to avoid, and that is that the jobber in practice, by reason of obtaining quantity discounts and for other reasons, often finds it expedient to tie up with one manufacturer or another as his sole representative in one or all lines of apparatus. Therefore we have in such cases a situation of the jobbing houses being recognized as the agents of one manufacturer or another. This sets up a condition under which, on account of the keen competition, manufacturers become critical—many times overcritical—of the distribution outlet furnished by the agent's jobber, often for reasons quite apart from the jobber's abiilty, and this is a force which tends to induce the manufacturer either to enlarge the outlet or create new ones.

What the ultimate result of this tendency will finally

*Speech delivered before National Electric Light Association at Atlantic City, May 17, 1922.

be it is difficult to state, but, if it should come about without any plan or program, simply through force of circumstances that the large manufacturers should to a still larger extent control their own jobbing houses, it brings forward an interesting problem as to what the effect will be upon the independent jobbers. By "independent" I mean those who buy their goods from any source which they choose and offer any kind of apparatus without restriction. They, of course, are bound to be in competition in some cases with the houses owned by the manufacturer, and, therefore, as to those cases at least, there must be a conflict of interests; but there is certainly one direction in which they can establish themselves in the strongest possible defensive position, and that is by allying themselves with the central-station company.

### The Jobber as an Ally of the Contractor-Dealer

If an independent jobber becomes a valuable load builder for the central station in his territory, he may be sure of co-operation and support, and that is the central point to which my remarks have led, viz., that the greatest opportunity for the highest development of the business of the jobber, independent or otherwise, lies in the direction of establishing himself, not as a mere vender of electrical appliances, but as a great power in the development of the electric light and power field of the country.

It is easy to say that if a jobber attends to his own business and sells goods, the result will be what I have just mentioned; but that is not the answer. His numerous salesmen are all available to spread proper propaganda in favor of the central-station company. He can furnish service to his customer of a character which will minimize criticism of service of the central station, and in general he can so conduct himself as to compel the central station to become his ally. But his most fruitful field is that of the dealer and contractor. By the selection, education, support and encouragement of the right men in these departments which furnish the touch with the public, the jobber may be able to build up a capable trade organization which will not only support his own business but which will also be a business-building organization for the central stations and which will command their support. He is, in fact, in the unique position in the electrical industry—a position which does not exist, I think, in the ordinary jobbing trade—of being able to secure valuable trade indorsement of a powerful interested party. He is a free agent and is no longer in the position of being ground between the upper and nether millstones of the manufacturer and the dealer central station of an earlier time.

I am not prepared to say that the present tendency of the manufacturer to control his distribution outlet will grow to any larger proportion than now exists or whether it is actually sound from an economic standpoint, but I do believe that whatever the future development may be, it will be the result of a slow growth and come about from the efforts of the electrical distribution business to find itself; and that the pivotal point around which the whole problem swings is the question which system is most demanded in the process of growth and development in the electric public utility field, and that demand will be measured by the relative value of the support which a given system furnishes in the matter of central-station business development, and central-station business development is only another name for public service.

### Growth of Superpower Systems

All interests in the public utility field realize that the electric light and power business is taking on a new form of development and is rapidly becoming a national public utility. The growth and rapid expansion of superpower lines, which entirely ignore state boundaries and reach into the operation of our national railway system, and the federal water-power act providing for water-power development on rivers coming within the jurisdiction of the United States government—and most of the important powers are on such rivers—inevitably tend to bring the industry more and more under the eye of the federal government.

This, together with the growth of powerful holding companies, whose operating properties cover large territories, necessarily has an effect upon the problem of distribution of electrical apparatus, and it would appear obvious that the effect will be in some case unfavorable to the small local jobber. If this is so, we should naturally look in the future to seeing an increase in the number of larger jobbing houses of the character of many with which we are familiar, covering a wide territory.

I should not, however, regard this evolution as at all inimical to the independent jobber. It simply furnishes an enlarged opportunity for outstanding vision, courage and ability. It also furnishes a greater field for a more comprehensive co-operation with the central-station interests and for the establishment of a business-getting value which will be an insurance for the future.

If I have made myself intelligible, you will understand that I have been leading up to the following summary of the situation between the manufacturer, the jobber, the jobber controlled by the manufacturer and the independent jobber—viz., whatever is the soundest method of distribution will in the end lead the procession, and one of the tests of which is the soundest, generally speaking, will be the relative character of public service which either one system or the other renders in the development of the field of the central-station company.

### Central Stations Must Provide Fair Field

I have devoted a lot of space to the outline of one of the tests which I think will help to determine the best method of distribution of electrical supplies and have based my whole argument on the premise tha the central-station companies will furnish an equal opportunity of endeavor, and that they will judge the activities of all who work in their field solely from a standpoint of results, with a full understanding that co-operation means joint action.

I regard the problem as essentially a local one and believe that it is impossible to proclaim a policy which can be reduced to a list of rules and regulations for individual power companies, but in general if the manufeatures, the jobber and the dealer are to be regarded as branches of the industry whose value is to be measured by the help they give in the development of the business of central-station companies, then the National Electric Light Association must carry the banner of a fair field and no favors.

# Technical Sessions

## Program

MONDAY, MAY 15

Address of chairman, N. A. Carle.
Report of committee and vote on constitutional amendments.

PARALLEL SESSION

Report of committee on hydraulic power, Markham Cheever.
Report of committee on underground systems, D. W. Roper.
Report of committee on safety rules, Thomas Sproule.

TUESDAY, MAY 16

Report of prime movers committee, H. P. Liversidge.

PARALLEL SESSION

Report of committee on inductive interference, A. E. Silver.
Report of joint public policy sub-committee on inductive interference. R. F. Pack for N. E. L. A. and Bancroft Gherardi for the A. T. & T. Co.

WEDNESDAY, MAY 17

Report of committee on electrical apparatus, A. H. Lawton.

THURSDAY, MAY 18

Report of committee on overhead systems, L. M. Klauber.

PARALLEL SESSION

Report of meter committee, W L. Wadsworth.
Paper, "Analysis of Economic Loss Due to Power Factor—Basic Meterable Factors," R. C. Fryer, J. E. Doran and J. B. Hodtum.

THE spirit of co-operation manifested by power and communication interests in attacking the inductive-interference problem and the general opinion that causes of service interruption should be carefully analyzed to eliminate them characterized the activities of the technical sessions of the National Electric Light Association convention this week. The importance of specifically defining the duty cycle of circuit breakers and the desirability of considering the safety code from a broad rather than a local point of view were leading topics at two of the sessions. Increasing attention to automatic operation of stations and out-door construction was also given.

## Inductive Interference

With a better and broader understanding of the situation, said A. E. Silver, chairman, inductive interference is generally recognized as a problem mutual in all its aspects, including the contributing causes, remedial measures and responsibilities of the signal and supply companies for its prevention or reduction. In its broad aspect the problem is not only one of mitigating present difficulties, but, what is more important, it is a problem of advancing and developing the art to the end that power and signal systems may be brought together harmoniously in rendering service in all communities.

A plan for the solution of inductive-interference problems has been recommended to the joint general committee representing the telephone and power interests, which includes co-operative planning for all new construction and general methods of co-ordination of both classes of lines by the use of precautionary methods which can be reasonably applied under conditions generally prevailing as distinguished from special situations.

Printed copies of the principles and practices for the inductive co-ordination of supply and signal systems completed since the printing of the regular committee report brought what some speakers described as a love feast in the discussion, which was remarkable not only because of the spirit of friendliness and co-operation but also because of the presence of some thirty-eight representatives of the American Telephone & Telegraph Company and the active participation of many of these men in the discussion.

R. F. Pack, in presenting the second report of the joint public policy committee for the National Electric Light Association, outlined the organization and earlier report of the committee and then presented the group of principles which he announced as having been agreed on by the representatives of both the light and power and telephone interests. The principles recognize broadly that both classes of service are essential to the public, that the problem is mutual and the solution must be co-operative. They emphasize first the duty of co-ordinating the signal and power systems to prevent interference due to the inductive susceptiveness of the signal circuits or the inductive influence of the power circuits. Complete co-operation, including mutual discussion of plans for construction or changes in either system's operating conditions, comes second, and detailed principles for the location of signal and power lines on the highway follows the specific recognition that highway use is essential to the economical and effective operation of both classes of service. Confidence, conference, co-operation and co-ordination were presented by Mr. Pack as essentials in carrying out and

making effective the principles, which he characterized as useless unless they were taken home and applied by the power and telephone companies in the spirit in which they were developed.

That there must be contact sufficient to insure a sympathetic understanding of the other man's problem before there could be effective co-operation was the gist of Bancroft Gherardi's report for the Bell telephone companies. On this basis he announced that steps had been taken to insure that the various Bell company officials and employees should know personally the men of the power organizations with which they must deal. Other speakers were L. H. Kennard, Bell Telephone Company of Pennsylvania; Paul Spencer, United Gas Improvement Company; J. A. Stewart, New York Telephone Company; Farley Osgood, Public Service Electric Company of New Jersey; A. D. Colvin, Hartford Electric Light Company; J. H. Matthews, Illinois Commerce Commission; G. C. Neff, Wisconsin River Power Company; C. P. Cooper, Ohio Bell Telephone Company; A. B. Campbell, Iowa Railroad Commission; P. M. Downing, Pacific Gas & Electric Company; E. H. Everett, New England Telephone Company; C. B. Hayden, Railroad Commission of Wisconsin, and W. E. Mitchell, Alabama Power Company.

## Prime Movers

Operating under the impetus established by the work of the prime movers committee during the last few years, this committee, under the excellent guidance of H. P. Liversidge of the Philadelphia Electric Company, presented a report this year which is the equal of previous years' reports in content as well as volume. The details are presented elsewhere in this issue.

The record which was presented on turbine outages and the efficiency and operating expenses of powdered fuel installations attracted the most discussion. O. F. Jungren of the General Electric Company expatiated on the relative advantages of single-drum and double-drum-type turbines, while F. Hodgkinson of the Westinghouse Electric & Manufacturing Company undertook to reply to many of his comments. Mr. Jungren contended that the temperature stresses, weight and size of the double-drum turbine are greater than those of the single-drum type, whereas Mr. Hodgkinson maintained the opposite. They agreed, however, that the conclusions regarding the relative merits of these types could hardly be drawn from the data presented, because most of the units were constructed under stress during the war period. Mr. Hodgkinson also pointed out that it is difficult to produce the most economical and reliable turbine and still meet competition. Since the construction of these turbines some very extensive investigations have been made to determine the causes of outages so that the possibilities of their recurring are very remote. Owing to the race for the greatest capacity at the lowest speed, the greatest development is likely to be in low-pressure turbines, Mr. Hodgkinson declared. He also expressed the belief that the next step will be toward higher pressure, possibly 500 lb. or 600 lb., but not toward higher temperatures. Hence the problem will be to separate the moisture which condenses in the lower-pressure stages. Turbines developed along these lines may not be so economical as the present ones, but the fuel economy of the plant should be increased. Stage bleeding for feed-water heating seems to be the tendency, and manufacturers must be prepared to permit the drawing off of steam at 150 deg. to 200 deg. Fahr. It is possible that heaters may be incorporated in the turbines so long as they do not imperil the structure of the turbine, Mr. Hodgkinson declared.

The real significance of the turbine committee's report on outages of turbines was sensed by E. S. Sniffen, Westinghouse Electric & Manufacturing Company, in the opinion of I. E. Moultrop, Edison Electric Illuminating Company of Boston. Mr. Sniffen pointed out that the real value of the data is the opportunity they offer to ascertain the causes of service interruption. He declared that if the turbine sub-committee on co-operation with the manufacturers would endeavor to classify still further the causes of outages so that manufacturers would have some basis on which to work in preventing their recurrence results of real value could be obtained. He also pointed out that it is necessary to determine what care shall be exercised in erecting them, and what operating rules shall be enforced.

Mr. Moultrop emphasized the fact that reliability ranks first in importance and economy second. A few per cent decrease in economy is of little importance when compared with the investment in turbine equipment which will lie idle when a unit is out of service.

### Experience with Powdered Fuel

Some results of efficiency tests at the Lakeside powdered-fuel station of the Milwaukee Electric Railway & Light Company and operating costs per kilowatt-hour were given by John Anderson of that company. He declared that if members are willing to accept the facts which he presented, they would no longer question the advisability of installing powdered fuel. The plant has been operating for fourteen months, one-half the time with one 20,000-kw. unit installed and the remainder of the time with 40,000-kw. in equipment installed. During that time 200,000,000 kw.-hr. has been generated without interruptions. Since operating conditions have not been adjusted to the point where the guaranteed turbine water rate has been obtained, and since continuous fuel composition has not been obtained, the most favorable economy and operating results have not been secured so far. Nevertheless, with coal varying from 9,000 to 13,500 B.t.u. and 15 per cent ash, and with a night load only 30 per cent of the day load, the following results have been obtained. Station water rate, 12.7 lb. per kilowatt-hour; steam for auxiliaries (allowing for banking of boilers), 2.4 per cent; boiler efficiency, 84.2 to 85.9 per cent (during steaming periods); over-all plant efficiency, 83.2 to 84.48 per cent; B.t.u. per kilowatt-hour (net), 19,097, and thermal efficiency (net), 17.88 per cent. When more normal conditions are obtained, Mr. Anderson feels confident that a thermal efficiency of 19.2 per cent and a boiler and economizer efficiency of 88 per cent will be obtained. From the tests which have been made he has come to the conclusion that the coal must be dried to contain not more than 7 or 8 per cent moisture, since anything in excess of this amount will cause irregular feeding of the fuel and increase the cost of conveying it. With a unit coal cost of $28.78 per 1,000,000 B.t.u. and a unit labor cost of 62.5 cents per man-hour, a total operating expense of 0.5053 cent per kilowatt-hour has been obtained. These figures also can be improved, he declared, when operating conditions become more normal.

Since it was necessary to do considerable pioneering in constructing this plant, it cost more than one should cost now that more experience is available. Mr. Anderson declared that if a plant were constructed now it could probably be built for 10 per cent less than the Lakeside plant. Answering some comments which have been raised regarding trouble with ash issuing from smokestacks of powdered-fuel installations, Mr. Anderson pointed out that 70 per cent of the ash is being removed at Lakeside before it enters the stacks by utilizing washers in the breeching back of the boilers.

## Electrical Apparatus

The more definite basis which has been established for rating oil circuit breakers and the account which was presented of automatic substations which have been installed recently constituted the principal features of the electrical apparatus committee report Wednesday afternoon, but the discussion extended into other fields. The features of the report are presented elsewhere. Notable among the subjects considered in the discussion were regulation of radio broadcasting, the standardization of service voltages, closed-circuit generator ventilation, use of inert gases to stifle generator fires and effectiveness of differential relays in disconnecting generators developing internal trouble. However, the chief discussion centered around what constitutes the duty cycle of an oil circuit breaker.

H. R. Summerhayes, General Electric Company, pointed out that the reason for proposing that the duty cycle start with the breakers in the closed position was that most breakers are in this position when they are subjected to a short circuit. When the short circuit occurs before the breaker is closed, the circuit conditions are usually investigated before the breaker is reclosed, so that it is possible to utilize a breaker rated on the one-shot basis. Mr. Summerhayes declared that manufacturers are willing to rate circuit breakers on any duty cycle so long as it is definite.

In answer to Philip Torchio, New York Edison Company, who asked why a duty cycle should ever be considered as starting with the breaker open, C. H. Roth, of Roth Brothers & Company, Chicago, pointed out that the Power Club considers that a breaker has performed its function after it has successfully opened a circuit so that the cycle should end with the breaker open. Mr. Torchio, however, contended that the requirement of a breaker is not only to open but to

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**L. M. KLAUBER**
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San Diego Consolidated Gas and Electric Co.

**MARKHAM CHEEVER**
Chief Engineer and General Superintendent
Utah Power & Light Co.

**W. L. WADSWORTH**
Superintendent of Meters
Minneapolis General Electric Co.

**D. W. ROPER**
Superintendent Street Department
Commonwealth Edison Co.

**A. E. SILVER**
Electrical Engineer
Electric Bond & Share Co.

**THOMAS SPROULE**
Assistant to General Superintendent of Distribution
Public Service Electric Co. of N.J.

*Chairmen of technical committees who presented reports at the Atlantic City convention and names of their respective committees: Mr. Liversidge, committee on prime movers; Mr. Lawton, committee on electrical apparatus; Mr. Klauber, committee on overhead systems; Mr. Cheever, committee on hydraulic power; Mr. Wadsworth, committee on meters; Mr. Roper, committee on underground systems; Mr. Silver, committee on inductive interference; Mr. Sproule, committee on safety rules.*

be able to close again. This requirement can be met, said Mr. Summerhayes, even with the duty cycle preferred by the Power Club by specifying a three-shot rating where two-shot duty is expected. The only purpose of adopting a definite duty cycle is to permit the comparison of breaker performance. G. L. Knight, Brooklyn Edison Company, referred to some extensive tests of oil circuit breakers in Baltimore, the results of which should dispel the fears of many central-station companies. These tests indicated that the majority of breakers would open five or six times at least. He also referred to straight-through disk-connecting switches which manufacturers will make available shortly as a means of eliminating the necessity of locks.

Recommendation was not made to standardize service voltages at this time, because of the difficulty which many central stations anticipate in adapting their systems to one standard. A tentative standard of 115 volts is therefore retained with recognized departures of 110 volts and 120 volts. However, a motion was made and passed that it was the consensus of opinion of the electrical apparatus meeting that the recommendation on service voltage be indorsed with a view toward ultimate adoption by the association.

The high points of the radio conference at Washington, so far as it bears on the central-station use of radio, were reviewed by C. T. Sinclair, Pennsylvania Water & Power Company, who pointed out that N. E. L. A. representatives at the conference proposed modifications of wave lengths where the radio telephone is used by central station companies. It was also brought out at the conference that an unnecessary handicap would be placed on central stations in the use of radio if the telephone operators are required to pass the radio operators' examination now required for broadcasting in general. Since the broadcasting which would be done by central stations is not required to extend beyond its system, and since the reception of other broadcasting on the central-station radio system would be a decided disadvantage in interstation communication, it was recommended that central-station radio-telephone systems should not operate at broadcasting frequencies. Wave bands of 3,300 m. to 2,850 m. and 1,650 m. to 1,550 m. were proposed. Permission was given by the conference to operate central-station radio stations with only a general knowledge of sending and receiving and the ability to receive Morse code at ten words per minute.

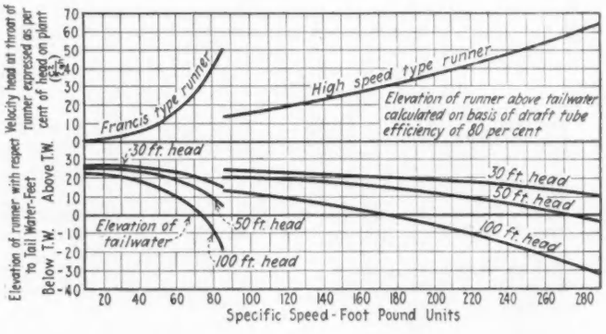
## Hydraulic Power

So much valuable material was accumulated by the hydraulic power committee, Markham Cheever chairman, during the year that the committee found it possible to make only a general résumé of its efforts. The investigation indicates that the principal progress in the design and construction of waterwheels and governors includes the further development of the high-speed runner, the flaring-draft tube, the further application of the overhung runner to the reaction turbine, the adaptation of governors to such special requirements as remote-control and automatic plants, and the further refinement of structural details of both wheels and governors. The development of larger units and lower heads has increased the demand for wheels of high specific speed. To meet this demand the unshrouded or propeller type of runner is rapidly developing in various forms.

One of the most interesting developments in turbine design is the inverted turbine which overcomes excessive draft-tube excavation and permits of inspection without stoplogs in the mouth of the tube. The ejector turbine is also an interesting development. This turbine makes provision for admitting water from the casing directly into the draft tube below the runner. In times of flood and high backwater this high-velocity bypassed water is used to increase the draft head and tends to maintain the power.

The success of outdoor substations in practically all climates has focused the attention of the designer on the possibility of further capital saving through the omission of the building housing the generating equipment. Operators at the present time do not favor the outdoor generating stations, believing that the objections to them outweigh the saving in capital cost.

The discussion of this report centered on the difference in operating conditions which will exist when hydro-electric plants are installed outdoors or half out-




COMPARISON OF FRANCIS AND PROPELLER TYPE RUNNERS

doors, the reasons for using semi-outdoor construction and the value of hydraulic instruments.

Since the placing of units outdoors involves a changed problem of ventilation and prevention of condensation of moisture on the windings, manufacturers are eager to get the operating viewpoint, said F. C. Hanker, Westinghouse Electric & Manufacturing Company. In considering outdoor construction, however, H. L. Wills, Georgia Railway & Power Company, warned that a company should not lean over backward and hesitate to adopt it just because it had not been done before. By proper housing the unit can be made as immune from weather conditions as if it were placed indoors, and repairs can be as easily taken care of by transferring the parts to an adjacent repair shop as by distributing them all over the floor of an indoor station.

Semi-outdoor construction at the Mitchell Dam plant of the Alabama Power Company, now under construction, was forced by the use of the backwater suppressors, declared J. M. Barry. In other words, to take advantage of the back-water suppressors the waterwheels had to be placed opposite the spillways. The wide separation of the generators thereby required virtually prohibited a single superstructure. Instead, separate inclosures with a removable roof are placed over each generator so that a single gantry crane can be used to handle any generator or waterwheel part.

L. M. Pharis referred to a semi-outdoor generating

station of the Utah Power & Light Company which has been in satisfactory operation since 1918. No units have had to be dismantled since installation. Another plant is under construction which will have generators with totally exposed thrust bearings and generator frame caps.

## Overhead Systems

Standard specifications for construction materials used on overhead systems and a method by which such standards may be formally adopted and promulgated by the association were among the chief subjects considered in the report of the overhead systems committee, L. M. Klauber chairman. The report also included new specifications for Western red-cedar poles, studies of the timber preservation situation, information on insulator practice and research, and construction and maintenance equipment and methods.

The specifications for construction materials have been modified so that now forty-four standards are ready to be studied and adopted by the association.

A résumé of the timber preservation situation emphasizes the fact that preservation is essential, and the open-tank treatment is especially commended. Four lines involving 3,626 poles are covered in the investigation. Of these poles 906 were treated with creosote in open tanks, and after being in service from nine to fourteen years only seventy, or 7.7 per cent, showed signs of decay. On the other hand, of the 1,001 poles to which a brush treatment with either creosote or carbolineum was given, 847, or 84 per cent, showed signs of decay.

As regards ravages of termites in wood poles, one company found that 80 per cent of the poles set before 1916 were affected. At present the best method of preventing their attacks seems to be impregnation of the timber with coal-tar creosote.

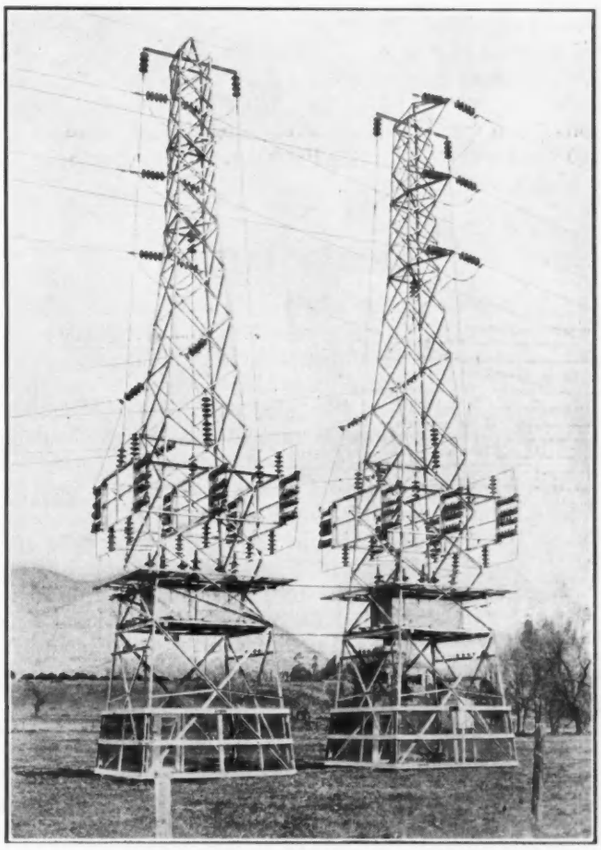
Considering insulator practice, the general expression among companies using either the suspension or the pin type is much more optimistic. Overinsulation is often desirable and may be economically justified in the majority of cases. Research on insulators during the past year consisted for the most part of an accelerated life test under non-humid conditions, corresponding to a period of actual life in service of ten years.

Work done on high-voltage transmission shows the consensus of opinion to be that 220-kv. transmission differs from that at 165 kv. in magnitude only and that no extraordinary or new phenomena need be expected. Experiments that have been in progress upon a 27-mile length of one of the Big Creek lines of the Southern California Edison Company indicate that corona losses with this voltage are in accord with the Peek formulas.

From the reception given a questionnaire sent out to ascertain the advisability of higher-voltage distribution lines it is evident that this is a subject of great interest and worthy of study. For many situations the well-standardized 2,300-volt and 4,000-volt systems are proving entirely inadequate or uneconomical. Several distribution lines operating at 6,600 volts, 11,000 volts and even higher voltages are being used to serve extensive areas.

The forty-odd items reported on the construction-materials specifications section of the report of the overhead-systems committee and the pole specifications in the report were formally accepted in the meeting of the committee on Thursday afternoon as recommended uniform tentative practices for use during the coming year by the members of the association.

The need of seasoning cross-arms as called for in the tentative specifications was questioned by John S. Ware of the Public Service Electric Company of New Jersey, and he suggested that the percentage of sap wood should be left to the judgment of the purchaser. The cross grain and check restrictions were characterized by Mr. Ware as too stringent. A plea for simplification and condensation of specifications was also made, including a suggestion that the new method of designating the classes of poles was enough like the old to cause some confusion. Thomas Sproule of the



COMBINED TRANSMISSION LINE SUPPORT AND OUTDOOR SUBSTATION

Public Service Electric Company of New Jersey urged getting away from designating poles by top dimensions and the adoption of butt dimensions.

W. K. Vanderpoel of the same company made a plea for the establishment of an inspection routine commensurate with the size of each member company for the inspection of construction materials.

H. W. Young of the Delta-Star Company said that tests made on the self-renewing fuse in Los Angeles recently were very satisfactory. Three fuses are used in each conductor of the circuit, and the second fuse went into service in from 30 cycles to 60 cycles after the first blew on a 50-cycle circuit. With about 500 transformers equipped, L. L. Elden of the Edison Illuminating Company of Boston said his company had found it possible to operate distribution transformers controlled by thermal indicators at a maximum of 175 per cent of rating night after night, and at 110 per

cent of rating during the hot summer months, without the loss of a single transformer.

Some disagreement was indicated by Mr. Elden as to the consistency of the claim that corrections for ambient temperature should be made in temperature control of distribution transformers when the practice is not followed with substation transformers. Tests indicate that the temperature-indicating device should be installed directly over the transformer core so that the stream of warm oil from the coils will strike it. The devices should be placed away from the influence of the temperature of the case. That 7,500 farmers in Wisconsin have electric service, which, on a basis of three customers per mile, indicates approximately 2,500 miles of circuit, was asserted by G. C. Neff, Madison, Wis., with the commission records of that state as authority. This is nearly equal to the entire mileage of pole lines in the city of Chicago, said Mr. Neff, and on this basis he estimated that if all the farms in the country were served, the mileage of lines would equal those needed for city and suburban service.

## Safety Rules

The report of the safety rules committee, Thomas Sproule chairman, was presented as a progress report and was a résumé of the activities of the committee since the last convention. They have consisted principally of a study of the third edition of the National Electrical Safety Code as revised and issued about one year ago. A complete list of the rules of the code which have been discussed by the committee is included, together with recommendations for such changes as were thought desirable, in order that the code may more nearly conform to well-established practice.

The committee has strongly expressed itself as favoring the unqualified indorsement of the National Electrical Safety Code as the standard for the preparation of regulatory rules. This indorsement is expressed notwithstanding the fact that there are important rules included to which the committee cannot agree.

It is the hope of the committee that all rules difficult of interpretation or which result in unnecessarily expensive construction will be promptly brought to its attention.

In the discussion on the safety rules committee's report the need felt by some of the state utility commissions for specifications that cover more things than hazardous conditions was brought out by J. H. Matthews, service engineer of the Illinois Commerce Commission. He called attention to the fact that regulatory commissions must consider character and quality of service.

Lack of knowledge of the National Electrical Safety Code on the part of utility managers, many of whom had never even heard of it, was given by A. B. Campbell, engineer of the Iowa Railroad Commission, as a common situation in his experience in dealing with the smaller utilities.

A recent section of the New York, New Haven & Hartford Railroad in sending out wholesale notices to telephone and power companies for the reconstruction of crossings in accordance with the American Railway Association specifications, which are more severe than the electrical safety code, aroused a lively discussion.

That the National Electrical Safety Code was not intended to be retroactive and should apply only to new construction, and also that it must not be expected to meet the complete approval of any body or even of any one individual, was the view expressed by Dr. M. G. Lloyd of the Bureau of Standards in closing the discussion. He also expressed gratification at the new method of working out changes of the code through the committee formed under the supervision of the American Engineering Standards Committee.

## Underground Systems

The collection of data on failure of underground cable operating at voltages from 6,600 to 25,000 inclusive is a feature of the report of the underground-systems committee, D. W. Roper chairman. The aggregate of all systems covered represents 4,675 miles of cable, on most of which approximately 12,000 volts is employed. The results for 1921 show a total of 467 cable and 192 joint failures, which is equal to 14.1 failures per 100 miles. If the failures attributed to external injury be omitted from the figures, the average failures per 100 miles of cable would be 10.4, or 8 per cent lower than for 1920. On a total of 76 miles of cable reported as purchased under N. E. L. A. specifications there were only four cable failures, equivalent to 5.3 per 100 miles. Failures on systems operating at voltages from 24,000 to 27,000 are not appreciably greater than on systems operating at approximately 12,000 volts. Out of the total of 659 cable failures the causes of 227 were unknown, while the rest were distributed as follows: Electrolysis, 67; adjacent cable failure, 54; other external injury, 52; defective joint, 45; overloading, 37; moisture in cable, 32; lightning, 30; dielectric loss, 26; cracking of sheath, 23; sharp bend in cable, 18; defective cable, 16; overheating not due to overloading, 15; moisture in joint, 13; known causes other than stated, 4.

The most common practice in new conduit construction favors not more than sixteen and preferably twelve ducts in one run. The need for a duct with a diameter as large as 4 in. has been questioned by a few operating engineers, but it continues to be widely used. Nearly all companies are making every effort to segregate the high-tension cables in separate runs from those containing the low-tension cables. Cable loss runs between 3.5 watts and 5.5 watts per square foot of conduit surface for high-tension cables and at considerably more for low-tension cables. Reports on temperature indicate a steep temperature gradient from cable to earth and a dangerous loading of the conduit run. Large conduit lines of thirty or forty ducts are very undesirable as they impose a serious limitation on the amount of current that can be carried in the cable. This is particularly important in the vicinity of stations and substations where the greatest obstruction occurs.

Much attention has been given to the engineering design of conduits and manholes, to provide ample space for training and for the proper location of the cable splices and conduit terminals, and also to the designing of conduit terminals to afford continuous fire protection. Of thirty-four companies reporting ten use fiber exclusively with average separation of 1 in. of concrete mixture, while nine companies use vitrified tile exclusively, covering the joints with very little concrete

mortar between ducts. Eight use both with a tendency toward working into the fiber class exclusively. Only three companies reported using stone conduit.

Several companies have purchased kenotron rectifying sets for cable-testing purposes, but these have not been entirely satisfactory. However, it is hoped that the difficulties and shortcomings will shortly be eliminated.

Actual quotations from the cable manufacturers demonstrate that by reducing the thickness of insulation to an amount which is sufficient to pass the tests required by the N. E. L. A. and the A. I. E. E. with a reasonable margin, the price of the cable can be materially reduced, the saving being as much as 15 per cent, or more in some cases. By not taking advantage of the recent development in cable manufacture a number of operating companies are installing larger ducts than necessary, at an increased cost. With cables now furnished the dielectric losses are so low that the critical temperature is no longer the limiting temperature for safe operation. Instead, the limit is now imposed by the maximum permissible temperature at which impregnated paper insulation can be operated without deterioration. Since manufacturers and engineers differ by 20 deg. C. on this limiting temperature, the committee has arranged with the Massachusetts Institute of Technology to make a special research on the subject.

### Cable Joint Troubles Increase at Higher Voltages

That joints of a type satisfactory on 9,000-volt underground cable had not proved satisfactory on 12,000-volt cables and are absolutely unsatisfactory at higher voltages up to 33,000 volts was asserted by W. L. Abbott, Commonwealth Edison Company. He said that it was possible to make up joints in the laboratory that would stand up under any reasonable test. The same joints made up and put into service in a cable installation for 33,000 volts stood up for a week under potential without load but broke down quickly when load transmission was undertaken.

Difficulties with lead-covered cables coated with cement mortar for fireproofing purposes were outlined by H. S. Phelps of the Philadelphia Electric Company.

The Hochstadter type of cable, it appeared in the discussion, had developed no cases of trouble in America, where it is not extensively used, but some trouble was reported from English experience as due to electrolytic action between the copper strips and lead sheath. Five out of six manufacturers will guarantee single-conductor cable for five years on 66,000-volt Y-connected circuits, said D. W. Beeman of New Bedford, who described investigations involving the feasibility of using such cables. D. W. Roper of the Commonwealth Edison Company, Chicago, told of the use of 60,000-volt cable in Paris and of 40,000-volt, three-conductor cable in Spain, as well as of a recent order placed in England for 50,000-volt, three-conductor cable for use in Holland. F. D. Wyatt of the Union Gas & Electric Company of Cincinnati called attention to the report of the Superpower Commission of the Netherlands, in which underground three-conductor cables for interconnection purposes operated at 50,000 volts were proposed and also single-conductor 70,000-volt cable for underground use.

In response to questions, Mr. Roper stated that the Commonwealth Edison Company utilized recording thermometers in idle ducts to keep check on duct temperatures. The thermocouple indicator is used for surveys to determine the temperature gradient between manholes. He asserted that the best information available indicated that American manufacturers can produce cable with as low dielectric losses as can the European manufacturers.

## Meters

The value of centralizing the maintenance of switchboard meters, instruments and relays is the underlying note in the report of the meter committee, of which W. L. Wadsworth was chairman.

An extensive study was made of many switchboard instruments, both direct-current and alternating-current, to determine the best types to use under any condition, requirements, location, means to facilitate testing, etc.

During the past year special consideration has been given to the revision of the "Electrical Meterman's Handbook." Many unimportant parts have been reduced or cut out entirely as obsolete and new subject matter has been added. Another important practice indorsed by the committee after consulting with manufacturers was the standardization of indoor-type instrument transformers used in consumers' installations, with particular reference to over-all distance between primary terminals of current transformers, template drilling dimensions, polarity and polarity marking.

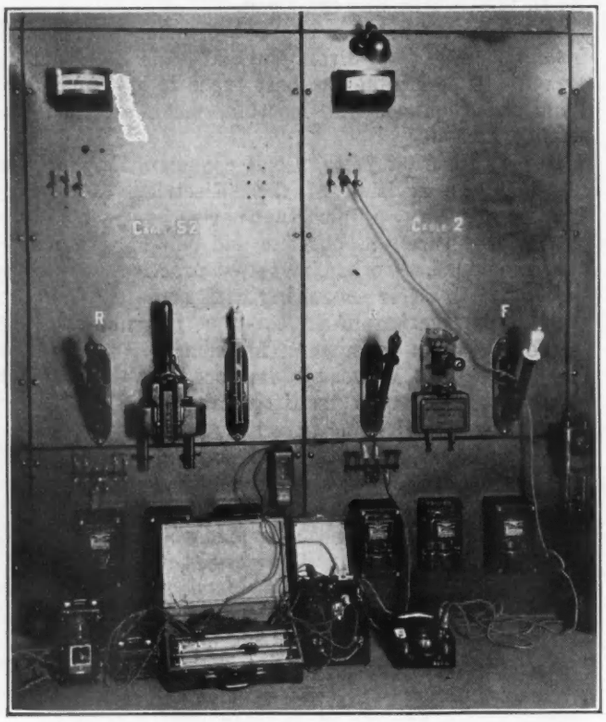
A recent survey of demand rates in use in the United States and Canada shows commonly in use five different demand schedules, the "flat demand rate," "Wright demand method," "Hopkinson demand rate," "block Hopkinson demand rate" and "Doherty or three-charge rate." Of 418 companies in cities of 20,000 population and more in the United States and of twenty companies in like cities in Canada, 374 utilities are making no correction for power factor of consumer, fifty-three companies are making twenty-one different corrections, and eleven companies are not reporting their rates.

In the standardization of meter and instrument design and construction several recommendations have been made such as counter-clockwise rotation of moving elements of watt-hour meters, space provided on the metal covers of watt-hour meters for serial numbers and the standardization of terminal chambers to simplify laboratory tests and the installation of meters when used with safety cabinets. Three manufacturing companies are now prepared to supply bottom-connected direct-current watt-hour meters. Information on new developments has also been collected.

### Kva. as Basis for Demand Billing

Virtually the entire discussion at the meter session was devoted to the effect of poor power factor on losses in the system. The discussion was opened by R. C. Fryer, Union Gas & Electric Company, Cincinnati, who outlined the conclusions which this company has reached as a result of a study to determine where the greatest loss occurs and to determine how the charges for service may be equitably redistributed in such a way that the customer will be induced to correct his power factor and thus release the equipment for other use. The conclusions reached are not intended to offer a method of increasing revenue. Mr. Fryer pointed out

that the major proportion of the loss is not reflected in coal consumption but in the extra investment necessary because of the poor power factor. This being the case, and since about 75 per cent of the power plant investment is in electrical equipment, he considers that the kilovolt-ampere demand is the best basis for establishing the return on the investment. The speaker was careful to state that he is not so certain that energy should be measured on the kilovolt-ampere-hour basis, believing that the present kilowatt-hour method is preferable until further knowledge is obtained. Five different instruments to measure kilovolt-ampere-hours are available, but only one is developed, the speaker declared, which is sufficiently accurate over the full range of power factors. He also called attention to a



**RELAYS SHOULD BE TESTED AT LEAST EVERY SIX MONTHS TO SECURE PROPER OPERATION**

Panel for 11,000-volt cables (right) and connections for testing induction and instantaneous relays. A special 0.5-kw. transformer excited from lighting circuit has slide-wire control in the primary side. Secondary circuit connects with the relay through a portable ammeter. Relays are adjusted with the cable out of service and the circuit breaker is tripped by each relay at the close of the test to prove the condition of the trip circuit and breaker.

recently developed meter originating from some cooperative work between the University of Cincinnati and the Union Gas & Electric Company. This meter will measure six factors, namely, kilowatt-hours, kilowatt demand (block interval), reactive kilovolt-amperes, kilovolt-ampere demand (block interval), reactive kilovolt-ampere-hours, and average power factor. This involves the use of two in-phase watt-hour meters and two reactive-component meters integrally connected to a pantagraph. The instrument, according to tests, is as accurate as present watt-hour meters. Owing to the expense of providing and installing the instruments, it is questionable whether it would be economical to use them at the present time except on the larger consumers' circuits. However, the speaker pointed out that it is the smaller company which is largely responsible for poor power factor. Since an inducement to improve power factor can be offered consumers in the form of a rate schedule through the use of this instrument, he expressed the belief that the use of this or some other instrument may be the means of building bigger business.

The question in adopting any instrument as a basis for reducing power factor is how many complications will be involved by installing and maintaining it and what the initial cost will be. Considering all these factors, G. A. Sawin, Westinghouse Electric & Manufacturing Company, expressed a preference for the new development.

L. L. Elden, Edison Electric Illuminating Company of Boston, emphasized the fact that small companies are the ones causing poor power factor, but the instruments which are available for detecting this at the present time are too expensive. Static condensers have been employed for correcting conditions, but their price is prohibitive. Any one who can find a solution for the power-factor problem will do more for the industry than by any other means, declared Mr. Elden.

C. W. Bates, Philadelphia Electric Company, declared that he is not certain whether the customers should not buy magnetizing current for alternating-current motors in the same way as they buy kilowatt-hours, instead of trying to install power-factor corrective apparatus. Attention was called to a way of determining reactive kilovolt-ampere demand from the motor rating.

A new development in power-factor meters which also records energy consumption was announced by H. J. Blakeslee, the States Company, who said that the new instrument consists essentially of two single-phase watt-hour meters and a graphic attachment which enables determination of power factor at any instant.

Considerable difficulty has been experienced by some companies in enforcing power-factor clauses, because it has been difficult to make the public comprehend the meaning of power factor. For this reason E. P. Peck, Utica (N. Y.) Gas & Electric Company, suggested that the meter committee or some other committee of the N. E. L. A. define power factor in simple terms which a layman can understand.

The remainder of the discussion at the meter session hinged on the question of whether the meter committee should extend the courses for educating meter men, or whether this work should be turned over to the educational bureau. O. J. Bushnell, Commonwealth Edison Company, Chicago, took the latter stand, whereas E. R. Horrell, Sangamo Electric & Manufacturing Company, favored the extension of the course. Mr. Bushnell also contended that raising the price of the meterman's handbook would limit its distribution where most needed. Mr. Horrell recommended that some steps be made to place the handbook in the hands of the smaller companies, which have the most need of it. He also pointed out that the geographic divisions have through the holding of open committee meetings brought information to many company men who have been unable to attend national conventions.

## Schuchardt Chairman-Elect

Officers of the Technical Section for the coming year were elected at the second session of this section on Tuesday afternoon. The new chairman is R. F. Schuchardt, electrical engineer of the Commonwealth Edison Company. H. P. Liversidge, L. M. Klauber and C. F. Hershfeld are the new vice-chairmen. A. Jackson Marshall is the secretary-elect.

# Commercial Sessions

## Program

MONDAY, MAY 15

Address of chairman, R. H. Tillman.
Report of Electric Vehicle Bureau, C. R. Skinner, Jr.
Report of committee on garages and garage rates, F. F. Sampson.
Report of committee on transportation, F. M. Feiker.
Report of committee on publicity, Norman Maul.
Report of exhibition committee, H. T. Luscomb.
Paper, "Electric Trucks in the Service of the American Railway Express Company," R. E. M. Cowie.
Report of committee on commercial service and relations with customers, Harold Wright.

TUESDAY, MAY 16

Report of Lighting Sales Bureau, L. R. Wallis.
Report of division on educational exhibits, Clarence L. Law.
Report of division on residence lighting, M. Luckiesh.
Report of division on industrial lighting, J. Daniels.
Report of division on street and highway lighting, A. D. Cameron.
Report of division on lighting of large buildings, Arthur S. Ives.
Report of division on commercial aspects of lamp equipment, G. H. Stickney.
Report of division on sign, display and billboard lighting, P. B. Zimmerman.
Report of division on store lighting, W. E. Rolinson.
Report of lighting department (joint committee for business development), P. B. Zimmerman.
Address, "Lighting Education," Ward Harrison.
Report of committee on wiring, G. E. Miller.
Report of department on wiring (joint committee for business development), A. K. Baylor.

WEDNESDAY, MAY 17

Report of Bureau on Merchandise Sales, C. E. Greenwood.
Report of division on central-station merchandising service, Thomas Berger.
Report of division on electric cooking and heating, C. O. Dunten.
Report of division on standardizing and testing, R. S. Hale.
Report of division on relations with manufacturers, F. D. Pembleton.
Report of department on appliances (joint committee for business development), C. E. Greenwood.
Report of committee on electrically equipped furniture, Joseph F. Becker.

THURSDAY, MAY 18

Report of Power Sales Bureau, Charles K. Nichols.
Report of division on electric power economics, John W. Meyer.
Report of division on industrial heating applications, V. M. F. Tallman.
Report of division on material handling, R. H. McLain.
Report of committee on education, Fred R. Jenkins.
Report of committee on "Electrical Salesman's Handbook," George H. Jones.

THE commercial sessions were well attended and well supported by discussion. The work of the year presented in the reports forms a rich harvest of data and experience, and the keynote of all the meetings seemed to be that at last the time had come to go ahead and here were tools to work with. Responsibility for results was put squarely up to the central-station executive by speakers in each session, who stressed particularly the fact that we must "sell" ourselves in the use of every kind of electric service before we can hope to "sell" the public. Throughout the program the plans of the joint committee for electrical development were made a feature of each session, and the part which the central-station man must play in leading the movement in his community was made plain.

## Electric Vehicles

The development of the market for electric vehicles shows slow but steady progress. The central-station income from this source in the city of Chicago is about $800,000 and in New York more than $1,000,000, a consumption there of over 30,000,000 kw.-hr. for vehicle battery charging. During the years 1920-21 central-station companies of the United States purchased 109 electric trucks, and 800 trucks have been sold in the two years 1920-21 in the New York metropolitan district alone. These facts are presented in the report of the Electric Vehicle Bureau as evidence of the immediate scope and possibilities of the electric vehicle as a central-station load.

One of the important subjects studied by the bureau this year has been the standardization of charging plugs, battery cradles and other vehicle features. A meeting of manufacturers was called, and the 150-amp. charging plug was settled upon for all electric street trucks. Progress has been made in other directions.

The committee on comparative data for transportation engineering has been engaged in compiling operating costs on electric trucks as compared with gasoline cars and horses. A large amount of truck experience has been examined, and the subject is being presented to the transportation engineering profession.

A very constructive work has been performed by the committee on garages and garage rates in the compilation of a list of all the charging stations in the country, to the end that electric vehicle owners may establish

charging stations in the territory in which their cars are operated. These data are still in process of preparation, and a study of the various ages of electric trucks now in service is being made, with the object of lengthening the period of serviceable life.

An interesting feature of the commercial session on Monday devoted to the Electric Vehicle Bureau was an address by Robert E. M. Cowie, vice-president American Railway Express Company. This company operates 17,500 horse-drawn vehicles, several thousand gasoline vehicles and about 1,444 electric units, but 83⅓ per cent of all the motor vehicles purchased for the metropolitan district of New York in the past year have been electric. The problem of supplanting other types of trucks with "electrics" is a problem of financing the investment and insuring adequate charging service for the local utilities, but the superiority of the electric vehicle has been satisfactorily established, in the company's experience, for large city service.

### Elimination of Waste

F. M. Feiker, New York, in discussing the status of the electric vehicle pointed out that the present wide general interest in the elimination of waste in industry affords a ready-made opportunity for the electric vehicle.

N. T. Wilcox, Keokuk, Iowa, said it should be appreciated that conditions have changed and there are now available sufficient data to enable the electric vehicle to go ahead. Therefore the central-station company should forget the inevitable disappointments and delays of the pioneering period and develop this valuable after-peak load. But the central-station man must convince himself before he can hope to convince his customers.

George B. Foster, Boston, stressed the need for more general enlightenment of central-station employees on vehicle subjects. Every electrical man, he said, has a groundwork of information about gas cars and should be ready to answer questions about the electric vehicle.

One of the most vital aspects of the whole vehicle situation, it was agreed in this discussion, is the need of adequate service facilities. The American Railway Express Company itself has had to withdraw electric vehicles from some cities because of improper servicing. Moreover, a careful study must be made of transportation costs in different classes of service, with comparisons between electric and other vehicles.

In answer to a quetsion, F. E. Whitney, Philadelphia, announced that the insurance companies had decided to allow a differential in favor of electric vehicles of 25 per cent on fire and theft and practically 50 per cent less than the gas-car rate on personal liability and casualty insurance.

A study of transportation costs was urged as an objective for the coming year with particular attention to proper figuring of depreciation, so that the industry may be able to develop the transportation field with the advantage of accurate knowledge.

### Commercial Service and Customer Relations

In carrying out its work during the past year the committee on commercial service and relations with customers, Harold Wright chairman, followed the recommendations of the committee for 1921 with good results. The committee has prepared nine "Service Suggestions" pamphlets and a chart and order system forms were offered to interested companies. The "Service Suggestions" were mailed to the commercial managers of the various companies, and the comments on their value have been very satisfactory.

G. E. Miller, Cleveland, in the discussion of this paper, stressed the practical benefits which had resulted from the fact that the committee had not held up the products of its work until convention time, but had sent its bulletins periodically.

George Neil, Hammond, Ind., urged the continued use of more and more pictures in disseminating this commercial service data, since "pictures talk where words will not."

## Lighting

Although the Lighting Sales Bureau, L. R. Wallis chairman, functioned this year with a reduced personnel, the full scope of its activities is covered in its report. The industrial lighting division deals briefly with tests made during the year, showing that the ease and speed with which an object is seen depends on illumination. Results of further productive intensity tests are given, with data on the status and provisions of industrial lighting codes.

It is suggested that the proper lighting of large buildings should be studied, not as a whole, but with consideration of the separate parts or rooms, and this applies to department stores as well as other large buildings. The value of different types of such buildings to the central-station company is discussed, and the advantage of good lighting to the buildings is outlined and a bibliography on the subject presented.

To the subject of store lighting particular attention is given. The activities of the past year in this field are reviewed and solutions suggested to meet the existing problems. A series of charts presents in a most impressive way the opportunity for store lighting which waits unnoticed all about the contractors and central stations in every city.

Street lighting is reported as the "only phase of electrical activity in which progression was unimpeded," for more street-lighting material was purchased and installed than in the previous year. There has been a definite trend toward the development of "white-way" lighting with important developments in Kansas City, Cleveland, Durham, N. C., and St. Paul. The introduction this year of a method for efficiency and economically lighting country roads and highways marks a distinctly fundamental event.

P. B. Zimmerman, chairman of the lighting department of the joint committee for business development, reviewed the work of that committee, pointing out that the Lighting Sales Bureau occupies a focal position in the campaign for better business, as it stands as the principal point of contact with the public. At present 59 per cent of the revenue of the central-station company is obtained from lighting business. Likewise 69 per cent of the jobbers' sales and 68 per cent of the dealers' sales are derived from business directly affected by lighting. It is extremely important, therefore, in these days when the popular interest is so concentrated on appliances, that effort be concentrated on lighting development even in excess of the natural proportion.

Ward Harrison, National Lamp Works, delivered an address on lighting education. Citing the case of the telephone, he pointed out the tremendous opportunity for the development of lighting business which waits

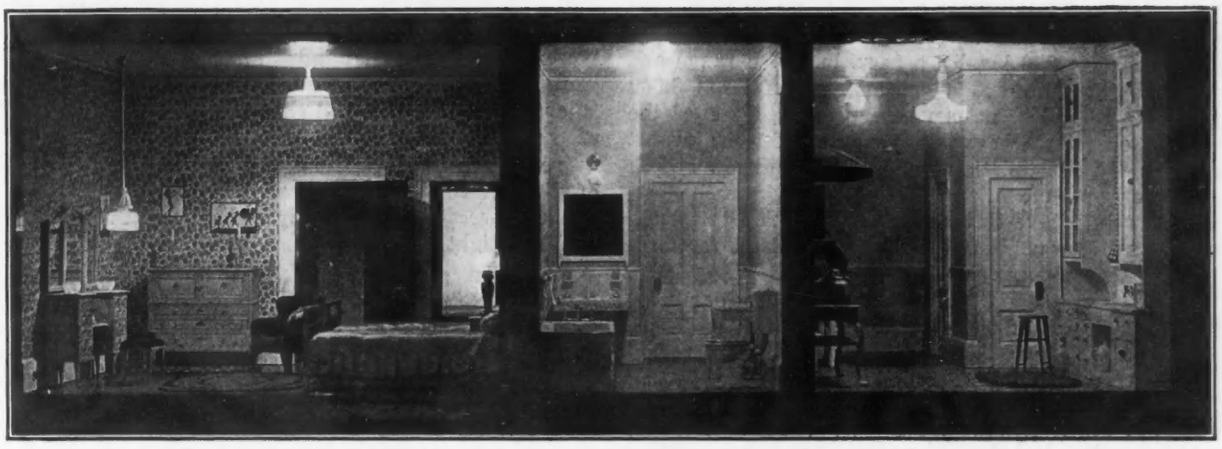
only upon the public appreciation of the value of proper lighting intensity. It is a problem of education as to scientific facts.

G. E. Miller, vice-chairman of the wiring committee, urged more attention to the commercial side of the wiring problem as the very fundamental of new-business development. There are many cities, he said, well saturated as to the number of homes which are wired and using service, but there are few of these homes which are themselves saturated electrically, because the use of electricity in them is limited by the knowledge of the dwellers. The great necessity, therefore, is to spread the idea so that the public will generally appreciate not only the many ways in which electricity can be helpfully used in a household today but the extent to which it can be utilized with increased comfort and satisfaction.

When the first practicable automobile came into use, Mr. Miller said, there were one million residence customers connected to central-station lines in this country, and see what has happened in the meantime. The automobile people have outsold the electrical industry in a most spectacular way. The average household consumer today has an annual bill of about $30; but compare this with what the average man spends on his car. "We don't know how to advertise and we don't take the trouble to learn how to do our job with thoroughness," said Mr. Miller. It is said that 80 per cent of the people have a mentality not exceeding that of a child twelve years old. It is therefore necessary in advertising to present a message so clearly and definitely that it is not necessary for the public to use any degree of imagination for themselves.

Therefore you must picture the benefits that wiring will bring before you can sell wiring, and if this is adequately done, every residence consumer can be developed to the point where he will pay the central station a revenue of $75 to $100 a year. This can be done by stimulating architects and home builders to increase the size of wiring installations, and in Cleveland they have been very successful in this work. In one case plans for twenty houses were submitted and the outlets increased 50 per cent by suggestion.

A. K. Baylor, chairman of the wiring department of the joint committee for business development, presented a report of his committee, sketching the work of the department in outline and submitting the guide book on wiring in which its recommendations are embodied. He stressed the point that it must be remembered that every appliance is a dead and useless thing until it is connected to the central station. Therefore it is the idea of the use of the appliance which must be sold in order to sell the appliance and the desire for wiring and for electric service.



PROPER ILLUMINATION OF THE HOME SHOWN BY MINIATURE APARTMENT IN LIGHTING EXHIBIT

## Merchandising

Four points were given particular attention in the report of the Merchandise Sales Bureau, C. E. Greenwood chairman. These were the importance of central-station merchandising service in the upbuilding of a broader program of commercial activity, the vital necessity of close co-ordination in the relationships with appliance manufacturers, the need for better methods of standardizing and testing household devices, and a general consideration of the electric cooking and heating market as an opportunity for sales promotion.

A committee of manufacturers was established as part of the executive committee, and such moot points as a wider "spread" for the dealer, quantity as a basis for discounts and methods of advertising co-operation were discussed. The contact proved educational and resultful, but no definite report on the work of the committee has been presented.

The division on electric cooking and heating expresses optimism as to the opportunity for the development not only of domestic-range business, but hotel, restaurant, club and society load, and lists three essentials for success: (1) A rate that will get the business; (2) an engineering department familiar with the characteristics of a range load, and (3) an organization "sold" on the merits of electric cooking. It takes up in detail training the sales force, trial installations, deferred payments, demonstrations, handling repairs and other practical aspects.

### Electrically Equipped Furniture

That electrically equipped furniture is no longer a theory but has become an accomplished fact was emphasized in the report of the electrically equipped furniture committee, Joseph F. Becker chairman. Not only have complete suits of furniture been so equipped for exhibition purposes, but individual pieces, such as the vanity table and spinet desk, are being manufactured in large numbers and cataloged by some of the prominent furni-

ture manufacturers. Electrically equipped furniture has aroused keen interest not only on the part of the public but on that of prominent furniture dealers as well. Only standard fittings such as the market now affords have been recommended by the committee in its specifications, which may be used by any furniture manufacturer distributing his products anywhere in the United States.

F. D. Pembleton reported on the work of the division on relations with manufacturers. No definite results can be cited, but the contact established has been most satisfactory as an influence in the stimulation of co-operation. Two meetings have been held with the manufacturers to the end that more economical distribution and a more effective advertising co-ordination may be worked out.

### VALUE OF COOKING LOAD HAS BEEN GREATLY UNDERESTIMATED

F. T. Wilcox, Keokuk, Iowa, said that central-station men have long been skeptical of the diversity factor in cooking load but now see that it is much more than was expected. If there were lighting only, a residence would consume 250 kw.-hr. a year, but with range and water heater connected a consumption of from 3,000 kw.-hr. to 5,000 kw.-hr. can be expected. He cited the case of Rochester, where a consumption of 1,300 kw.-hr. is obtained in installations with a double-throw switch from the range alone, and 3,600 kw.-hr. from the customer. It will take time, he said, to develop this business in a big way, but it is the hope of all forward-thinking central-station men.

H. L. Grant urged the elimination of seldom-used types of flatirons and other devices to save waste. There must be a wide spread, he said, between the manufacturer's cost and the retail price in this industry, just as there is in any other industry, and the greatest impulse for the sale of cooking equipment will come from ample margins and satisfying profits on sales. The dealer must be encouraged to help the industry by receiving protection from the central-station company and a margin of profit as a reward for his efforts favorably comparable with the earnings of other merchants.

On the call of Mr. Byrne of Omaha, a count was taken of the number of men in the room who use electric ranges in their own homes. There were twenty, less than 10 per cent of the audience.

J. F. Roche won applause by describing his personal experience in his own household. To sell ranges, he said, every electrical man who can obtain a range rate should cook by electricity because if he cannot convince his own wife he can hardly hope to convince somebody else's wife. From the standpoint of service nothing is so good in its public relations influence as a range well sold, and the business should be developed from the service point of view instead of the kilowatt-hour standpoint. Mr. Roche said that his family had been cooking by electricity for ten years and there are eleven people in the household, eight of them children, using twenty-five appliances. His monthly bill averages in the neighborhood of $10. "We must begin," he said, "on the development of the cooking field by selling to ourselves."

J. F. Orr of Boise reported fully 1,350 ranges in operation in that city of 21,000 residence customers. All these ranges have been sold at list price with charge for connections.

## Industrial Load

Investigations and work by the Power Sales Bureau, C. K. Nichols chairman, were continued along the same lines that have been found successful in previous years. Many of the data prepared by the bureau have already been published in the association bulletin, it being believed this would afford much quicker distribution.

The industrial heating division has made a careful study of the possibilities for the development of central-station business through large heating load, and while the opportunity is great, what is needed is men competent to develop it. Accordingly, this division early decided to devote the major part of its efforts to the educational features of the electric heating problem.

As the handling of material with electric power has become such an important field for development of a power load, a material-handling division of the bureau was formed rather late in the year and presented an oral report at the convention.

During the year requests have been made for the bureau to supply speakers at meetings and conventions of manufacturers to deliver papers on the use of electric power by the particular industry whose representatives were to assemble. This activity should be stimulated in every possible way and should be an important part of the future work of the bureau.

Included in the report is a very complete bibliography of all addresses, papers and committee reports published in the *Proceedings* or monthly *Bulletins* of the National Electric Light Association.

### EDUCATION

The education committee, Fred R. Jenkins chairman, reported a marked increase in the use of the commercial courses and attributed this to the gradual betterment of the business and financial situation, resulting in the companies again becoming more actively interested in the commercial branch of the business.

An encouraging feature of the past year's business has been the adoption of the courses by some of the smaller companies in the large holding organizations. All the commercial courses, as in former years, have proved to be self-supporting. The committee has under consideration combinations of the two courses to take care of certain requirements of the various branches of the business.

Discussion in the power session centered largely around the subject of industrial heating. M. F. Tallman, Boston, announced that, in addition to the division report, five other papers have been prepared and will be published on the following subjects: (1) "Melting Gray Iron by Electricity," (2) "Malleable Cast Iron and Its Production in the Electric Furnace," (3) "Handling Electric Heating Apparatus by Central Stations," (4) "Use of Electric Heating in Brass Manufacturing Operations," and (5) "A Directory of the Makers and Users of Electrical Heating Equipment." It is little appreciated, he said, how great is the volume of business offered by industrial heating. The average of a large number of installations which he has reviewed shows an annual consumption of 2,140 kw.-hr. for every kilowatt connected, which at a 2.44-cent rate returns an annual revenue of $51 per kilowatt.

Dr. C. F. Hirshfeld, Detroit, spoke of the general ignorance as to the true importance of the electric heating opportunity. The average central-station man con-

siders only the thermal comparison between electric heating and heating by other processes, ignoring the other potentialities involved. But it is the total finished cost that counts. Individual costs of procedure are not essential, for economies due to small number of rejections or to safety or speed or reduction in the materials required combine to produce a net efficiency. The industrial heating load at the present time is 1,250,000 kw., compared with a motor load of 10,000,000 kw. Therefore the heating load is more than one-tenth of the motor load already. Dr. Hirshfeld predicted that the industrial heating load will grow to be two and a half to three times the motor load. The improvements in equipment make electric heating of value to industry. Therefore industry will demand it, and the central station will be obliged to provide it.

Wirt Scott, Mansfield, Ohio, cited some typical cases of men who had investigated industrial heating five or eight years ago and, having condemned it, still refuse to give it attention. He warned against overengineering in industrial heating installations and making them unnecessarily expensive.

H. H. Holding, Newark, N. J., said that up to now more attention has been paid to producing textbooks than to the actual education of men, and the industry should now endeavor to develop at least one trained industrial heating man in each central-station company. G. E. Miller, Cleveland, moved a vote of thanks to the General Electric Company and the Westinghouse Electric & Manufacturing Company for the industrial heating courses which they have established for the education of central-station salesmen.

## Commercial Section Officers Elected

AT THE close of the session the nominating committee presented its report and these Commercial Section officers were elected for the coming year: Chairman, O. R. Hogue, Commonwealth Edison Company, Chicago; vice-chairmen, N. T. Wilcox, Mississippi River Power Company, Keokuk; G. E. Miller, Cleveland Electric Illuminating Company, and W. E. Putnam, Idaho Power Company, Boise; executive committee, R. H. Tillman, Consolidated Gas, Electric & Power Company, Baltimore; Morse Dell Plain, Northern Indiana Gas & Electric Company, Hammond, Ind.; Clarence Law, New York Edison Company, New York, and Rawson Collier, Central Hudson Gas & Electric Company, Poughkeepsie, N. Y.

**C. K. NICHOLS**
Superintendent Power Bureau
New York Edison Co.

**C. E. GREENWOOD**
Appliance Department,
Edison Electric
Illuminating Co. of Boston

**L. R. WALLIS**
Superintendent Sales Department
Edison Electric
Illuminating Co. of Boston

**HAROLD WRIGHT**
Chief Clerk
Commonwealth Edison Co.

**J. F. BECKER**
Sales Manager
United Elect. Light & Power Co.

**C. L. LAW**
Manager of Bureau of
Illuminating Engineering
New York Edison Co.

**NORMAN MAUL**
Manager Editorial Bureau
New York Edison Co.

**H. T. LUSCOMB**
General Engineer of Contract
and Inspection Department
New York Edison Co.

*Chairmen of commercial committees who presented reports at the Atlantic City convention and the committees that they head: Mr. Nichols, committee on power sales; Mr. Greenwood, committee on merchandise sales; Mr. Wallis, committee on lighting sales; Mr. Wright, committee on commercial service and relations with customers; Mr. Becker, committee on electrically equipped furniture; Mr. Law, committee on educational exhibits; Mr. Maul, committee on publicity; Mr. Luscomb, committee on exhibition.*

# Accounting Sessions

## Program

TUESDAY, MAY 16

Address of chairman, E. J. Fowler.
Report of committee on accounting education, Fred R. Jenkins.
Report of committee on classification of accounts, reports to commissions and relations with other associations, W. J. Meyers.
Report of committee on budget, Harry A. Snow.
Report of committee on Accounting Service to Member Companies and the Monthly Bulletin, W. A. Jones.

WEDNESDAY, MAY 17

Report of committee on federal income-tax procedure, F. B. Odlum.
Address George C. Mathews, Chief Statistician Railroad Commission of Wisconsin.
Report of committee on customers' records and billing methods, J. D. Jacobus.
Report of committee on accounts payable records, E. A. Davis.

THURSDAY, MAY 18

Report of committee on fixed capital records, J. H. Lobban.
Report of committee on security holders' records, Robert Davey.
Report of committee on purchasing and storeroom accounting, W. F. Stevens.

GREAT interest in the development of budgeting to include construction, operation, materials and supplies and cash requirements, from the dual angles of forecast and control, was shown at the first accounting session. Chairman E. J. Fowler opened with a strong appeal to members to realize the responsibilities of committee work when accepting membership on such bodies, urging them to make these clear to their superiors in carrying forward these duties. Attendance by geographic chairmen at group and executive committee meetings was urged. A good record has been made this year in this respect.

## Uniform Classification

Although the committee on classification of accounts, reports to commissions and relations with other associations, W. J. Meyers chairman, held no formal meetings during the year, its informal activity was considerable. Its most important work was in connection with a system of accounts for the use of licenses of the Federal Power Commission. Some very valuable results were accomplished also in connection with a conference of public service commission statisticians for the purpose of considering the "Commissioners' Uniform System of Accounts for Electrical Corporations." At this conference some very objectionable modifications to that system of accounts were opposed, and the committee not only pointed out the objections to the proposed changes, but further called attention to the fact that if nation-wide uniformity in the classification of accounts is to be secured, all proposals for amendments of the commissioners' classification ought, before consideration by any individual commission, to be submitted to the appropriate committee of the commissioners' association.

After this report had been abstracted by Chairman Meyers, O. C. Semple of the New York Public Service Commission inquired as to the views of the association regarding depreciation accounting. Several speakers outlined their opposition to the straight-line theory based on estimated equipment life and urged reserving funds for depreciation on the basis of experience and judgment. A full statement of the viewpoint of the association was published by it in connection with recent testimony before the Federal Power Commission. Paul Jones, H. L. Doherty & Company, New York, opposed any requirement that utilities report property in a depreciated condition. James Lawrence, vice-president American Light & Traction Company, New York, stated that in 1923 his companies would use the new classification of accounts.

A detailed discussion of topics common to the four types of budgets is given in the report of the budget committee, H. A. Snow, chairman. The committee belives that no company should operate without a construction budget. Its possibilities are manifold since it serves as a statement of construction requirements, as an instrument of control over capital expenditures, as an engineer's report and as a statement of monthly distribution of construction expenditures. The committee points out that the preparation of the construction budget is the most important factor in the budget scheme and should be executed according to a definite program and one that is sure of obtaining the best judgment and opinion of all parties responsible for the design, construction and operating policies of the company.

An extended discussion followed the reading of this report by Chairman Snow. D. W. Harris, New York City, urged allowing each individual in a public utility who has control of the expenditure of money a voice in budget planning. Alex Dow, president Detroit Edison Company, cited the value of the budget of the type described by the committee. Experience in handling a budget increases the accuracy of its predictions. In 1920 the company lost 70,000 kw., or one-third of its total load, and this came so suddenly that it was very difficult to anticipate either financial or material requirements. The company had an eighteen-million-dollar construction program that year and spent $16,000,000. Although the budget was limited as to its accuracy under these emergency conditions, it none the less had much value, and Mr. Dow said that in the long run the budget system will enable an executive to keep reasonably close track from day to day of what is needed in the way of equipment and money. The range of error under normal conditions is such that the slowing down of three or four days in payments will bring the bank balance and receipts into line. Mr. Dow urged the importance of watching estimates closely and keeping them from over-running in budget making. A variation of 10 per cent should be explained by the budget estimator.

## Customers' Records

In its report for the year 1922 the customers' records and billing methods committee, J. D. Jacobus chairman, prepared a classification of the elements that enter into the cost of a bill and the keeping of customers' accounting records. This classification was forwarded to member companies, and while the number of reports received as compared with those sent out was not large, they covered a vast territory and for

that reason are interesting, as they represent practically every section of the country. These reports have been classified as follows: Companies having up to 10,000 meters; companies having from 10,000 to 25,000 meters; companies having from 25,000 to 50,000 meters; companies having from 50,000 to 100,000 meters, and companies having more than 100,000 meters.

Code numbers have been assigned, and in the event of member companies desiring specific information it can be readily obtained from the records on file at the association headquarters.

The Baltimore plan of bookkeeping without books occupied the entire time for discusion of the report of the committee on customers' records and billing methods. Briefly, the method consists of bills to which a stub is atached. This stub is torn off and constitutes the office record of the customers' account, and the bill is sent out. Seventy-five per cent of the bills are paid on or before the due date and are therefore cash transactions. The remaining 25 per cent are delinquents and are carried in proper filing arangements until they are paid, or the next month's bills are made out and the balances transferred, when they become reference files only.

Up to March 1, 1922, there were 1,399 subscribers to the elementary course and 286 subscribers to the advanced course in accounting which are being conducted by the accounting educational committee, Fred R. Jenkins chairman. The Accounting Section now has chairmen representing committees in nine geographic divisions. The general plan of the geographic division committees consists of dividing the territory among their members, each member getting in touch with the various companies and working with them through an appointed representative.

Following Mr. Jenkins' presentation of this report, H. M. Edwards, New York, arose and paid high tribute to the former's association work in accounting education. Brief appreciative reference was then made to the lecture course in business economics by Dean Harriman of the Northwestern School of Commerce, now being given to employees and executives of the Insull properties.

That a uniform classification of acounting for electric utilities is probably impossible unless it be the one agreed on by the Accounting National Section and the committee of the National Association of Railway and Utilities Commissioners was the warning given by George C. Matthews in discussing the uniform classifica-

**W. F. STEVENS**
Superintendent Supply Department
Edison Electric Illuminating Co. of Boston

**ROBERT DAVEY**
Secretary Accounting Operations
Consumers Power Co.

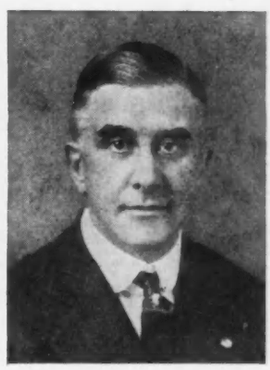
**H. A. SNOW**
Statistician
Detroit Edison Co.

**W. J. MEYERS**
Secretary
The United Electric Light & Power Co.

**J. D. JACOBUS**
Chief Clerk Customers' Accts.
Detroit Edison Co.

**F. B. ODLUM**
Attorney
Electric Bond & Share Co.

**E. A. DAVIS**
Middle West Utilities Co.



**FRED R. JENKINS**
Mgr., Central Station Institute
Commonwealth Edison Co.

*Chairmen of accounting committees who presented reports at Atlantic City Convention: Mr. Stevens, committee on purchasing and storeroom accounting; Mr. Davey, committee on security holders' records; Mr. Snow, committee on budget; Mr. Meyers, committee on classification of accounts; Mr. Jacobus, committee on customers' records and billing methods; Mr. Odlum, committee on federal income tax procedure; Mr. Davis, committee on accounts payable records; Mr. Jenkins, committee on accounting education.*

tion of accounts before the second session of the Accounting Section, Wednesday afternoon. This is due to the fact that the various commissions cannot be expected to push the adoption of the classification unless there is an active demand for it and support from the utilities interested, as there is not a pressing enough need from the commission viewpoint alone.

The scope of the work outlined by the committee on accounts payable records covers methods of vouchering, forms, filing methods, accounts-payable ledgers and cash-disbursement records. E. A. Davis, the chairman, indicated that, the committee having been organized only a couple of months ago, it was impossible to reach conclusions of a definite character on any matters under study. He said that the committee work as planned would be based largely on close co-operative work with the geographic division committees.

The first annual report of the committee on fixed-capital records, J. H. Lobban chairman, indicates that nearly all of the electric light and power companies make their write-offs of property retired by work orders, but less than 20 per cent are able to determine the exact amount of credit to property other than by estimate. Information was received by the committee from seventy-one companies, describing their method of construction accounting and keeping property records, and the conclusions to be drawn from these replies are given in the report. The advantages of keeping property records, items which should be included in any property record and the cost of property records are outlined, and the appendix shows a detailed property records routine, including twenty-nine diagrams and forms.

In the discussion it was agreed that much quicker and more favorable action by commissions was attainable in rate and capitalization cases where utilities maintain adequate fixed-capital records. H. J. Lewall, Philadelphia, for the American Gas Association, congratulated the committee on its work.

The security holders' records committee, Robert Davey chairman, endeavored during the year to draw up a uniform records system which might be adopted by any company entering into the customer-ownership field, such system to take up the work immediately following a sale or a subscription. Among the subjects discussed are the following: The form of receipt to be issued at the time the sale is made and before the delivery of stock certificate or official stock subscription receipt, the relative merits of the plan of issuing official stock subscription receipts and the pass-book form under the partial-payment plan, a method of reporting to the general office by district officers for companies operating in various districts, record of partial payments, the addressograph method of compiling lists and dividend checks, issuance and delivery of stock certificates, and the method of completing the accounting on the general office books. The text is amplified by forms for use in applying the suggested system.

W. Paxton Little, Niagara Falls (N. Y.) Power Company, then described his methods of keeping security holders' records, reading from an article he contributed to the ELECTRICAL WORLD of Oct. 22, 1921. Richard Mueller, Commonwealth Edison Company, Chicago, touched upon the problem of making immediate deliveries of certificates to purchasers after their final payments. In his organization 15,000 accounts in ten series requiring the services of four bookkeepers present a question of some difficulty from this standpoint. The advisability of using diplomacy in calling delinquents' attention to lagging payments was also emphasized in the discussion.

# Purchasing

An unusually interesting and instructive report was presented by the purchasing and storeroom accounting committee, W. F. Stevens chairman. The subjects of warehousing of poles, code numbers for stock items, classifications of stock accounts and centralization of salvage works are treated in detail in separate parts of the report. The yard for the storage of poles should be carefully designed, not only as to location with reference to market and transportation, but as regards railroad sidings, skids, roadways, equipment, etc., each of which is discussed in detail. An ideal design for a system of yards is also given with appropriate diagrams.

E. S. Brock, Public Service Electric Company, Newark, N. J., said that in twenty-nine decentralized stock rooms a three months' turnover is obtained. Continuous inventories were favored by W. J. Hart, Philadelphia; W. A. Jones, New York; C. Marden, Chicago, and Chairman W. F. Stevens, Boston. L. A. Coleman, United Electric Light & Power Company, New York, and other speakers were strongly in favor of salvaging equipment and supplies through a committee, holding this to be beyond the competence of an individual in most cases.

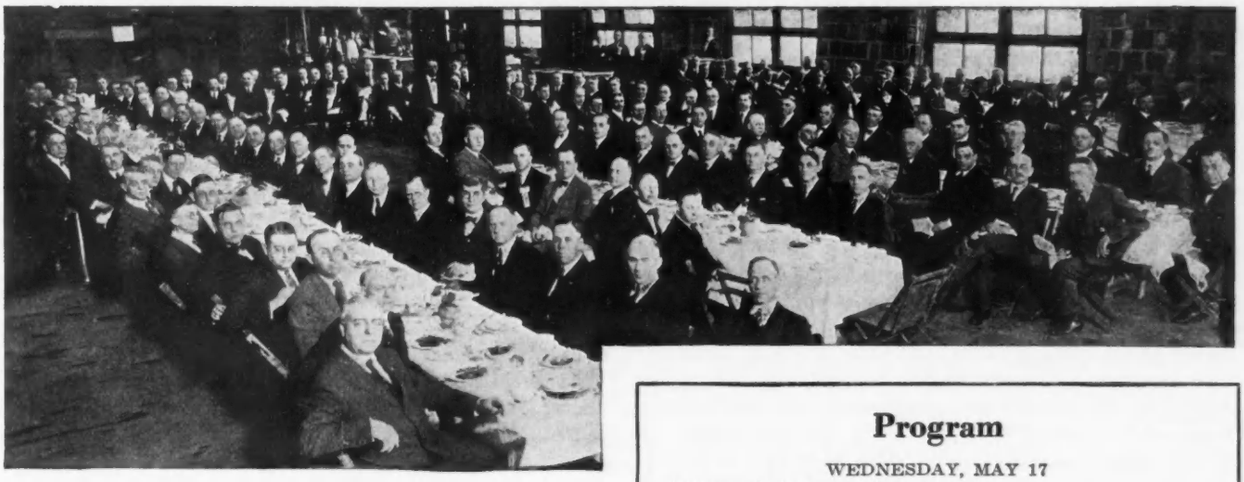
### ACCOUNTING WORK GROWING BROADER

That the central-station industry has lost many millions of dollars through inadequate fixed-capital records, now happily being established by the more progressive companies, was the striking feature of the third and final session of the National Accounting Section on Thursday afternoon under Chairman E. J. Fowler. The desire to act as a clearing house for accounting discussions during the year was expressed by the committee on accounting service to member companies. Practice in developing security holders' records was outlined by the committee of that name, the importance of prompt delivery to purchasers being stressed. Regular inventories, preferably by successive monthly adjustments of stock accounts, were favored by the committee on purchasing and storeroom accounting and by the delegates present.

## Schmidt New Section Chairman

William Schmidt, Jr., Consolidated Gas, Electric Light & Power Company, Baltimore, was elected chairman of the accounting section for the coming year. The vice-chairmen elected were: W. E. Long, Philadelphia Electric Company; W. A. Jones, Henry L. Doherty & Company, New York, and W. Paxton Little, Niagara Falls (N. Y.) Power Company. Members-at-large elected were H. M. Edwards, New York; A. R. Patterson, Boston; R. M. MacLetchie, Birmingham, and George B. Thomas, Salt Lake City. In accepting the chiarmanship Mr. Schmidt said that the biggest problem ahead is securing the adoption of the uniform classification of accounts by state commissions.

# Public Relations Sessions



GROWING interest in the work of the Public Relations National Section was evident in the session Wednesday afternoon, the industry having been attracted by the need of better popular understanding of its purposes and problems and by vigorous efforts to organize effective programs to bring this about. In his opening address Chairman Insull stressed the competitive aspects of central-station service, pointing out that such a utility should treat the public even better than it would if it were possible for customers to secure their desired service next door.

## Publicity

For the first time the viewpoint of the women of the industry has been recognized through the report of the women's public information committee, Miss O. A. Bursiel chairman. Starting with the purpose of educating the women of the industry in its economic fundamentals, this committee prepared four lectures to be given before the woman employees of electric light and power companies. The titles are, respectively, "Public Relations, Facts, Figures, Investments and the Busines as a Whole," "The Home Electrified," "Electric Cooking," and "Relations of Employees to the Public—Courtesy and Good Will," the first three have been printed and distributed. The report said that these lectures wherever given have been well received.

Chairman Insull then called attention to the importance of stronger executive support of the work of the committee on employee relations with the public. No report was presented.

A statement of the amount of advertising donated by the manufacturers for the promotion of good will was given by the manufacturers' advertising committee, P. L. Thomson chairman. For business reasons this advertising has not been so extensive as it was in the year previous. The quality, however, has remained high. Attention was directed to the publicity secured from certain national magazines and banking houses. In conclusion, the committee pointed out that the responsibility for getting the manufacturers to see why they should carry a share of the work of securing better public relations rests on the electric light and power companies.

Commenting on the report, Vice-President F. W. Smith said that the work of the Public Relations National Section bids fair to develop into one of the most important activities of the N. E. L. A. The speaker paid a glowing tribute to the constructive efforts of Chairman Insull in this section.

Little had been accomplished by the public-speaking committee, H. C. Couch chairman, during the first year of its existence beyond procuring approval of plans for a speakers' handbook and suggesting to utility managers that they "exchange pulpits."

The committee on state organization of public information, H. T. Sands chairman, reported seventeen committees operating in twenty-four states, or fourteen states more than a year ago. Preliminary meetings looking toward similar committees in other states were reported. In every state where these committees have been at work, the committee stated, there is already a noticeable disposition on the part of the press to approach the problems of the public utility industry in a saner way than heretofore. The committee was of the opinion that a strong, permanent organization would result if the interest of the outstanding men in each of the four branches of the utility industry were first secured.

### Program

WEDNESDAY, MAY 17

Address of chairman, M. J. Insull.
Appointment of nominating committee.
Report of committee on women's public information, Olive A. Bursiel.
Report of committee on employee relations with the public, H. C. Blackwell.
Report of committee on manufacturers' advertising, P. L. Thomson.
Report of committee on public speaking, H. C. Couch.
Report of committee on relations with bankers, M. S. Sloan.
Report of committee on state organization of public information, H. T. Sands.
Report of committee on uniformity of state regulatory laws, W. W. Freeman.
Announcements.
Report of committee on upbuilding the industry, F. R. Coates.
Report of nominating committee.
Election of officers.

THURSDAY, MAY 18

(With music)
Report of public policy committee, Sidney Z. Mitchell.
Addresses (speakers of national prominence invited).

## Regulation and Finance

For the guidance of state legislatures and utility companies a draft of a so-called model public regulation act will be made soon under N. E. L. A. auspices, declared W. W. Freeman, chairman of the committee on regulatory laws. Conferences in the committee have resulted in substantial agreement, and when the N. E. L. A. act is drafted it will then be submitted to various other national utility bodies for consideration. In view of the diversified interests of many of the N. E. L. A. members, it is thought that no serious difficulty will arise in obtaining in due course an agreement upon a detailed statute draft. The N. E. L. A., the speaker said, has no patent upon the idea of a uniform act and will co-operate actively in its furtherance. The speaker paid a well-deserved tribute to the committee members whose legal talents and experience have been so freely placed at its disposal.

In view of the recent return from Europe of Chairman F. R. Coates of the committee on upbuilding the industry, the report on this subject was postponed.

H. T. Sands, president of the Haverhill (Mass.) Electric Company and an officer in other Tenney companies, Boston, was elected chairman of the section for the ensuing year. Vice-chairmen elected were F. R. Coates, W. H. McGrath and E. A. Barrows. Members-at-large until 1925 elected were A. C. Marshall, J. F. Gilchrist and T. W. Martin.

## State Public Utility Information Bureau Directors Meet

ANIMATED and constructive discussion of the most successful ways and means of getting the utility story to the people marked the first meeting of the directors of public utility information bureaus on Tuesday. J. B. Mullaney, director of the Illinois committee, acting as chairman, directed the discussion of the papers in a masterly manner and every vital point was dwelt upon. Four papers were read and discussed during the afternoon.

Four salient points are to be remembered if a public utility information bureau is to be a success, H. M. Lytle, associate director of the Illinois committee, declared in his paper, "The Newspaper Relationship." These points are; (1) There must be constant thought

**F. R. COATES**
President and General Manager
Toledo Railways & Light Co.

**W. W. FREEMAN**
President
The Union Gas & Electric Co.

**MISS OLIVE A. BURSIEL**
Secretary New England Division,
N. E. L. A.

**H. C. BLACKWELL**
Kansas City Light & Power Co.

**P. L. THOMSON**
Advertising Manager
Western Electric Co.

**H. C. COUCH**
President and General Manager
Arkansas Light & Power Co.

**M. S. SLOAN**
President
Brooklyn Edison Co.

**H. T. SANDS**
Charles H. Tenney & Co.

*Chairmen of public relations committees who presented reports at Atlantic City Convention, and committees over which they presided during the past year: Mr. Coates, committee on upbuilding the industry; Mr. Freeman, committee on uniformity of state regulatory laws; Miss Bursiel, committee on women's public information; Mr. Blackwell, committee on employee relations with the public; Mr. Thomson, committee on manufacturers' advertising; Mr. Couch, committee on public speaking; Mr. Sloan, committee on relations with bankers; Mr. Sands, committee on state organization of public information.*

and effort. (2) The so-called press-agent type of publicity man has proved to be a flash in the pan. (3) Information must be collected and collaborated from every branch of the industry, for at best the individual knows only his own department. (4) More progress in educating utility employees in their business has been made in the past three years than in all the previous years combined, but this in reality is only a step. It was pointed out that few utility companies have even as yet organized themselves in a publicity, advertising or public relations way. Many continue to buy expensive space in advertising columns and then fill it with badly written matter which creates no good impression except upon the man who wrote it. Definite technique is required to do this, and it takes a skilled workman to tell a story in an advertisement successfully.

### SPEAKERS' BUREAU OF VITAL IMPORTANCE

Operation of a speakers' bureau in connection with state committees on public utility information is so vital, said Benjamin E. Ling, director of the Ohio committee, in his paper, "Public Addresses as Good-Will Builders," that it is doubtful whether this great co-operative effort at gaining good will for the public utility can be successful without it. The messages about the public utility industry which these public speakers have been able to "put across" in Ohio have had most pleasing results, and he thought that these results can be duplicated in every other state.

Excellent results were pointed to as a result of personal letters from the bureau directors when editorials and articles appeared in the press which showed misinformation on the part of the editor. Copies of such letters—which naturally treat only of the general utility situation and not of any local problem—are sent to utility executives in the city where the newspaper is published, so that, if advisable, information as to the local aspects may be added to the general information.

In his paper, "Possibilities in Public Utility Conventions," Alfred Fischer, director of the Michigan committee, dwelt on the possibilities of making the utility convention a great public mass meeting. He pointed out the desirability of throwing open the doors of the convention to the public and particularly emphasized the value of making the power plant available for public inspection. Mr. Fischer brought out the fact that the most successful means of reaching the public has been to leave discussion of utility problems out of the picture until the agricultural, industrial and civic dependence of a community upon electric power has been explained. Then the relation of the utility development to the communities growth will naturally follow and be understood by the public.

The enormous value of imbuing engineering students with proper ideas of utility problems was emphasized by Horace M. Davis of Lincoln, Neb., who cited several specific cases where direct benefit had resulted from holding state conventions at the state universities and colleges. Participation in the convention programs by the engineering faculty has been found to be highly advisable as it brings out an unusually instructive interchange of viewpoints.

In discussing this phase of public utility information the good moral support of the manufacturers was commended, and it was held that the value of the publicity efforts made by these manufacturers in the past cannot be overestimated. It was pointed out, however, by Howard T. Sands of Boston that it is now the duty of the utilities themselves to bear all the expense of this publicity.

Nothing can be so important as education relative to the utility industry, for it is its cornerstone, declared E. E. Lincoln, head of the chair of public utilities of Harvard University, at the second meeting. In Harvard University this is considered one of the most important subjects. There is the most profound ignorance relative to all public utility affairs. There is nothing too elementary to explain. For thirty years men in the utility business have gone on assuming a situation—assuming that the public knew about their business—and the public has known nothing.

"I agree with every word the chairman (Bernard J. Mullaney) has said relative to municipal ownership," said Professor Lincoln. "The way to attack it is merely to give the public the facts relative to the industry. The public will make up its mind as to the facts, but any intensive move throughout the country against municipal ownership might have a disastrous effect."

John C. Mellett, director of the Indiana Committee on Public Utility Information, told of the co-operative effort under way in that state with the public schools, particularly high schools and colleges. A series of pamphlets, duplicating those published by the Illinois committee, has been sent to those schools requesting such pamphlets. These requests are brought through letters sent to the school superintendents advising them of the committee's work in preparing such informative matter.

H. M. Lytle, for the Illinois committee, said that it first had dealt with 356 high schools, but that since then the list had been expanded to 887 high schools and thirty colleges and universities of the state.

### CLOSE CO-OPERATION URGED

Joseph B. Groce, director New England Bureau of Public Service Information, declared that there is a necessity for the closest c-operation between the various state committees and the national associations. He said the big work before the committees and the national associations is to sell to America the knowledge that the utility industry is second only to farming as the nation's greatest enterprise and that it is a great industry whose essential character is such that unless it progresses and prospers the nation cannot prosper.

Labert St. Clair, publicity manager of the American Electric Railway Association, and Charles W. Person, secretary advertising section, American Gas Association, who were present, volunteered the closest co-operation with the state committees. Mr. St. Clair said that the state committees were close to the ground and could localize publicity and educational effort in a way that would get actual results which such effort directed from a centralized source could not hope to accomplish.

H. T. Sands, chairman public relations committee, N. E. L. A., said that the work of the committees must be carried out on state lines, that there must not be too much organization between the various state committees, and that they must continue their policy of hammering home the truths relative to the industry and staying out of controversies.

To work out a clear-cut program of co-operation between the state committees and the national associations, it was resolved to appoint a committee from the state directors to meet with the secretaries of the three national associations.

# Breaker Rating and Automatic Substation Attract Special Attention

## Electrical Apparatus Committee of N. E. L. A. Also Dwells on Transformer Standardization, Interchangeability of Oils, Closed-Circuit Ventilation, Excitation, Service Voltages, Power Factor, Motor-Starting Current and Radio

RATING of oil circuit breakers and the progress which has been made recently in applying automatic substations to various kinds of service received considerable attention this year in the report of the electrical apparatus committee of the National Electric Light Association, of which A. H. Lawton is chairman. Special consideration was also devoted to the trend in providing excitation, the progress in standardizing transformers and the oil used in them, the basis for performance guarantees, and the status of radio as it bears on central-station operation. Service voltages, power factor, motor-starting currents and the alternating-current elevator motor also came in for discussion, along with other things.

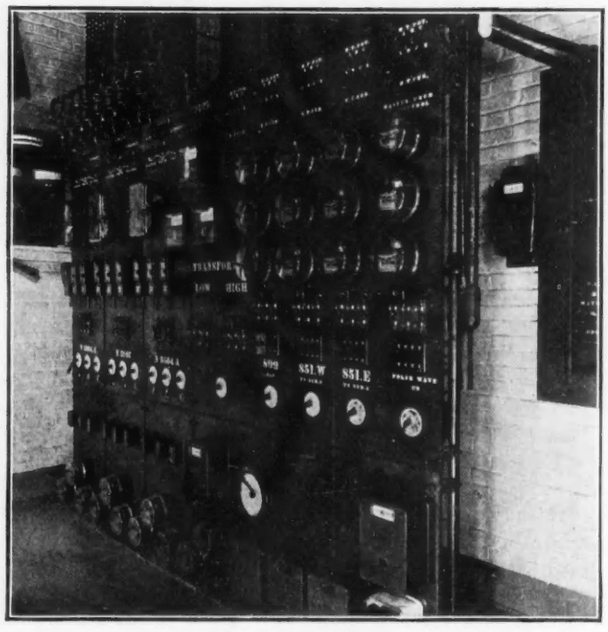
This year the efforts of the committee have been directed toward harmonizing the circuit-breaker requirements specified by operating companies. So many differences were found to exist that it was necessary to redefine "duty cycle," "condition after duty cycle" and "interrupting rating."

As a result it has been decided that duty cycle is the specified number of times at stated intervals that a breaker interrupts a circuit. It begins with the breaker in the closed position and is completed when the breaker is in the final open position. There is a possibility that two duty cycles must be recognized—one starting with the breaker closed and the other with the breaker open.

It was further decided that the breaker shall be substantially in the same mechanical condition at the end as at the beginning of the specified duty cycle and shall not have emitted flame. Furthermore, the breaker shall be capable of carrying rated current at the rated frequency and voltage. It is not to be inferred, however, that the breaker may be reclosed without inspection and making repairs if necessary.

The "interrupting rating" is based on the root-mean-square current at normal voltage which the breaker can interrupt under the specified duty cycle.

To cover the majority of existing conditions the committee recommends five duty-cycle standards, as follows: (A) One interruption (one shot) heavy overload duty; (B) two shots with two-minute interval; (C) four shots with thirty-second intervals; (D) four shots with one-half second interval, and (E) 300 shots with fifteen-minute intervals. The first duty seems desirable as a basis for checking safety factor of old breakers and also for new breakers where the duty imposed never exceeds that specified. Most breakers are now rated on the two-shot basis (B), which is comparable with the requirements on underground circuits. The three-shot, thirty-second interval duty (C) seems best for overhead circuits, while the modified




CONTROL BOARD OF AUTOMATIC ALTERNATING-CURRENT FEEDER SUBSTATION AT ST. LOUIS, MO.

three-shot duty (D) seems best for automatic substation service. Duty E is intended for service where many interruptions occur per day.

According to an analysis of circuit-breaker performances, twenty out of twenty-nine breakers failed or were damaged in performing interrupting duty. Five successfully ruptured the circuit, and four were examples of failures due to other causes than interrupting duty. One of the five successful performances was reported as rupturing two and one-half times the rated capacity. Of the twenty units which failed, ten did so while interrupting more than rated current and nine while interrupting less than rated current. One could not be classified because of lack of data.

Substantial progress is reported in the development of control devices for automatic substations, and several recently installed stations of this type, both direct current and alternating-current, are described.

The high cost of control equipment required to convert existing manually operated direct-current substations for automatic operation is no doubt the reason for the few changes which have been considered. Where new substations are contemplated, particularly the standard stepdown transformer substation with feeder regulators connected to an alternating-current distribution system, designs for automatic operation should receive careful consideration. For this class of substation, according to the committee, it can be confidently

stated that successful operation will result. It is likewise probably true that in most cases of alternating current substations, the annual charges—*i.e.*, investment and operating charges—are less than for a substation where attendants are required. The use of automatic substations permits the greatest flexibility and economies in the design of the distribution system. In addition, the automatic control devices give a character of service superior to the highest-grade of service delivered from manually operated substations. This follows from the accuracy with which these devices respond to the settings for which they are adjusted. This fact further prompts the suggestion that service from manned substations can be improved by the installation of automatic-control devices.

Considerable progress has been made in actual installations of automatic alternating-current substation equipment during the year. The power supply for actuating the oil circuit breakers is arranged somewhat differently in the several cases. In two instances the oil circuit breakers are operated individually by solenoids and motors, the operating power being furnished by control storage batteries. In one installation the circuit breakers are operated by individual alternating-current solenoids, the operating power being supplied by control transformers. In one substation gang operation of all oil circuit breakers has been provided, one alternating-current motor operating a cam which in turn operates a separate cam for each circuit breaker.

Some difference in practice exists in the substations described with regard to (1) the number of reclosures of oil circuit breakers provided by the control equipment; (2) the interval between reclosures, and (3) the question of reclosure at all under certain conditions of short circuit.

Suitable devices are now obtainable to permit automatic operation in accordance with any of the following basic schemes:

*Scheme* 1.—Under this scheme provision is made when the circuit breaker is opened as a result of overload conditions for three reclosures at very short intervals regardless of the nature of the overload. After three reclosures the circuit breaker will open and remain open if a short circuit persists. The merit of this arrangement is that it tends to prevent loss of load.

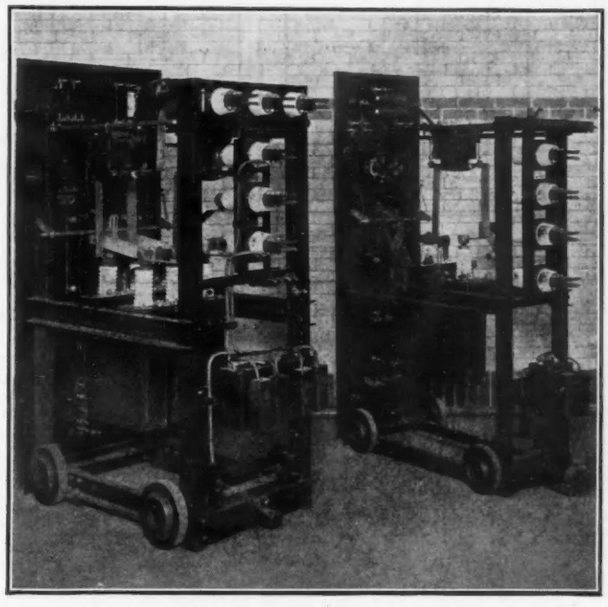
*Scheme* 2.—Under this scheme a motor-driven periodic relay or timer is employed. This timer can be made to reclose the circuit breaker at definite intervals varying from a few seconds to two minutes, depending upon the gearing used with the timer. The total number of reclosures depends upon the number of contacts on the drum of the timer. The customary number is three.

*Scheme* 3.—This scheme is a combination of the first and second schemes. It differentiates between a short circuit and an overload less than 50 per cent of short-circuit current value. Should a short circuit occur, a motor-driven timer will be placed in operation and function as outlined in Scheme 2. Should the overload current be less than 50 per cent of short-circuit current value, a service-restoring relay will function as outlined in Scheme 1.

*Scheme* 4.—The fourth scheme provides for periodic reclosing as in the second scheme by using a motor-driven timer, but with selective action to permit reclosure of only one circuit at a time on account of the limited capacity of the control storage battery. The selective action is secured by means of a motor-driven master controller which is caused to rotate by the opening of a circuit breaker. The release coils of the timers on the several circuits are connected to this controller. Once the master controller releases the timers, the three reclosures for each circuit are governed by the operation of its individual timer.

### TRANSFORMER STANDARDIZATION

The standardization of transformer sizes, voltages and taps has been carried forward and extended to include accessories and name-plate markings. Recommendations are made to extend the present standards



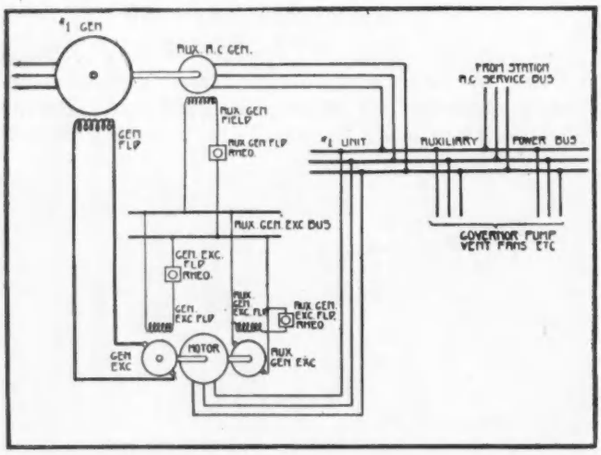
TRIPLE-POLE AND SINGLE-POLE TRUCK-TYPE SWITCHBOARDS USED IN LOUISVILLE (KY.) SUBSTATION

to include 33,000-volt single and three-phase distribution transformers, and also to include distribution transformers with 2,300 volts low-tension rating in certain sizes. For power service the committee recommends the extension of present standardized ratings to cover transformers taking power from standard system voltages of 44,000 volts and above and supplying nominal 6,600-volt, 11,000-volt and 13,200-volt secondary distribution. Certain voltage ratings and sizes have been designated as preferred in both distribution and power transformers with the hope of directing the trend of future transformer development into the fewer sizes, thus making possible lower factory costs and hence reduced purchase prices.

Interchangeability of oil for transformers has been agreed upon by the two largest manufacturers of transformers, and the standard oil of either manufacturer has been accepted by most of the smaller manufacturers for replacement use in the latter's transformers. Recommendations have been made covering performance guarantees of all standard transformers for lighting and power service in order to clarify the wording of the present pamphlet on transformer standards. Experience is reported with regard to drying oil by means of the centrifugal separator and a method is described for drying out large power transformers.

Three actual installations of closed-circuit ventilation for generators have been reported to the committee, in all

of which cooling is accomplished by passage of the air through water spray. These have been designed to obtain the advantages of cleaner windings, decreased liability of internal fires, and in one case to conserve the heat from generator losses. In this case the cooling water is taken from the city mains and pumped into the boiler feed-water heaters.




COMBINATION AUXILIARY AND EXCITATION SUPPLY SUGGESTED FOR LARGE HYDRO-ELECTRIC UNITS

Several instances have been reported during the year of generator fires being quickly extinguished by steam. Only one fire in a generator equipped with water-spray equipment has been reported, and this was quickly extinguished, but with considerable damage. The use of inert gases to stifle combustion has been suggested, one plant now being equipped with carbon-dioxide nozzles.

Considerable variation seems to exist in the current settings of differential relays, ranging from 15 to 125 per cent of full-load current. The high setting is provided to avoid unnecessary disconnection, abnormal conditions being indicated at much lower current by an alarm.

The advantages of separation of the control from the exciter system so as to make it entirely independent have led the engineers of one company to provide two separate control systems in a very large station recently placed in operation. Two oil circuit breakers are provided in series on each circuit and are connected to different control systems. Both are automatic, so that in case the first switch should fail to function, the second would surely do so, even should the control supply to the former be interrupted.

Use of individual exciters for generators has increased considerably, some being turbine-driven, some electrically driven, and others having a combination of the two drives. At Keokuk fifteen generators with individual motor-driven exciters have been operated successfully for many years without any provision for emergency except spare parts. At the Hell Gate station, New York, generators with directly connected exciters are provided without any alternative supply of excitation. With the individual excitation scheme it is practically possible to eliminate the losses in the generator-field rheostats by operating the exciter throughout its stable voltage range and using the generator-field rheostat only for lower voltages.

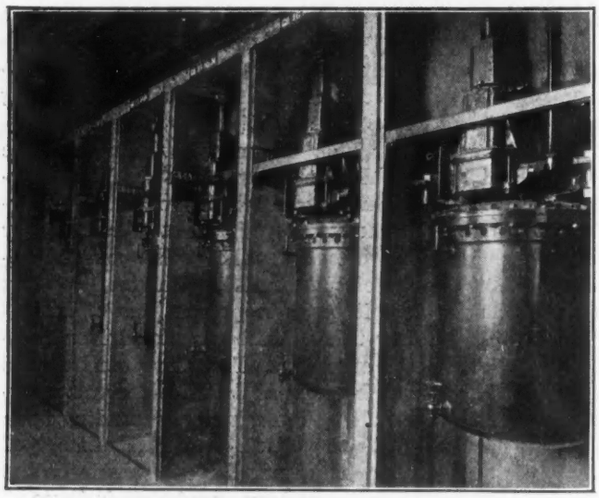
Greatly increased use of electrically driven auxiliaries is reported, 2,300-volt motors being used in some cases wherever the rating is over 40 hp. and in other cases where it is over 100 hp.

The development of the alternating-current motor to replace satisfactorily the direct-current motor for variable-speed service is progressing, but it still continues to be a serious problem. In this connection it can be reported that the experience with the brush-shifting motors installed in the fall of 1920 in the Springdale station has been quite satisfactory. The boiler forced-draft fans in the Hell Gate station are driven by 350-hp. motors of the brush-shifting type.

Grounding of the neutral of three-phase generators in order to limit the voltage stresses to ground throughout the system has practically become standard practice for both 25-cycle and 60-cycle systems. On most systems it has been found desirable to make the ground connection through a current-limiting resistor, in order to limit these ground currents. However, on a few of the larger underground systems, notably at Baltimore and Detroit, neutrals of all the generators are tied together and solidly grounded, thus limiting the voltage stresses, though involving heavy ground currents.

The motor rules have received consideration, and it is recommended that no charges be made this year. An interesting digest is given of the factors entering into the consideration of motor starting currents, and a description of new developments in motor starters is included. The improvement of motor power factor and system power factor are given brief mention. Particular attention has been paid to alternating-current elevator motors.

The tentative recommendations of last year on standardization of service voltage are discussed as to their



THESE OIL CIRCUIT BREAKERS HAVE THE UNUSUALLY LARGE RUPTURING CAPACITY OF 1,500,000 KVA. AT 13,200 VOLTS

effect on lamps, small motors and household appliances. The committee recommends that the report remain in tentative form for another year.

A general review of the radio situation and an outline of electrical developments in the textile, steel, paper, moving-picture, oil and break-making industries conclude the report.

Some large motor-driven centrifugal gas compressors are described, and data are given relative to a new line of synchronous motors recently developed for power-factor correction.

# Adopt Inductive Interference Principles

## Second Report of the General Joint Committee Includes Principles for Governing Future Work — Public Interest Is Recognized as the Paramount Factor in Arriving at a Solution of the Problem

IN ADDITION to the regular committee report, the second report of the general joint committee of the National Electric Light Association and the Bell Telephone System on joint relations between supply and signal systems was presented at the inductive-interference committee meeting at Atlantic City this week. The first report, made on March 7, 1922, was a statement of agreement on the use of the National Electrical Safety Code for crossings and conflicts and a statement of the position of both interests on the inductive-interference problem and of the existing status of the subjects of joint pole occupancy and parallel construction. A recommended plan of procedure was also included. The second report represents the actual working out of the fundamental principles on which detailed rules and the development work of the future will be based. They are important as representing a definite step in the joint committee work and the first attempt to make a statement of principles in which public interest to service is the governing factor. Not only will the future joint work be governed by this code of principles, but they are now in form to put to practical use in situations where inductive-interference rules of some character must be adopted before detailed rules are agreed on. The complete code of principles is as follows:

### SCOPE

These principles and practices are intended to apply to all new installations, extensions and reconstructions and to the maintenance, operation and changes of all signal and supply systems where inductive co-ordination may be required now or later to prevent interference with the rendering or providing of supply or signal service.

### PRINCIPLES

*Duty of Co-ordination.*—(a) In order to meet the reasonable service needs of the public, all supply and signal circuits with their associated apparatus should be located, constructed, operated and maintained in conformity with general co-ordinated methods which maintain due regard to the prevention of interference with the rendering of either service. These methods should include limiting the inductive influence of the supply circuits, or the inductive susceptiveness of the signal circuits, or the inductive coupling between circuits, or a combination of these, in the most convenient and economical manner.

(b) Where general co-ordinated methods will be insufficient, such specific co-ordinated methods suited to the situation should be applied to the systems of either or both kinds as will most conveniently and economically prevent interference, the methods to be based on the knowledge of the art.

*Co-operation.*—In order that full benefit may be derived from these principles and in order to facilitate their proper application, all utilities between whose facilities inductive co-ordination may now or later be necessary should adequately co-operate along the following lines:

(a) Each utility should give to other utilities in the same general territory advance notice of any construction or change in construction or in operating conditions of its facilities concerned, or likely to be concerned, in situations of proximity.

(b) If it appears to any utility concerned that further consideration is necessary, the utilities should confer and co-operate to secure inductive co-ordination in accordance with the principles set forth herein.

(c) To assist in promoting conformity with these principles, an arrangement should be set up between all utilities whose facilities occupy the same general territory providing for the interchange of pertinent data and information, including that relative to proposed and existing construction and changes in operating conditions concerned or likely to be concerned in situations of proximity.

*Choice Between Specific Methods.*—When specific co-ordinated methods are necessary and there is a choice between specific methods, those which provide the best engineering solution should be adopted.

(a) The specific methods selected should be such as to meet the service requirements of both systems in the most convenient and economical manner without regard to whether they apply to supply systems or signal systems or both.

(b) In determining what specific methods are most convenient and economical in any situation for preventing interference, all factors for all facilities concerned should be taken into consideration, including present factors and those which can be reasonably foreseen.

(c) In determining whether specific methods, where necessary, shall be wholly by separation or partly by methods based on less separation, the choice should be such as to secure the greatest present and future economy and convenience in the rendering of both services.

*Inductive Co-ordination for Existing Construction.*—(a) Utilities operating supply or signal circuits should exercise due diligence in applying co-ordinated methods, as occasion may arise, in accordance with these principles, to existing construction.

(b) When supply or signal circuits are generally reconstructed or when associated apparatus is rearranged or added, or when any change is made in the arrangement or characteristics of circuits, the new or changed parts should be brought into conformity with these principles.

*Co-ordinated Locations for Lines.*—Utilization of the highways is essential to the economical and efficient extension, operation and maintenance of supply and signal facilities. To avoid unduly increasing the number or difficulty of situations of inductive or other exposure incident to the use of the same highway by two different kinds of facilities, all lines should, in general, be located as follows:

(a) General Location.—(1) Where the conditions and character of the circuits permit, joint use of poles by signal and supply circuits is generally preferable to separate lines when justified by considerations of safety, economy and convenience, and presuming satisfactory agreement between the parties concerned as to terms and conditions.

(2) Where signal circuits and supply circuits on the same highway are not to occupy joint poles or where either kind of circuit is alone on a highway, all signal circuits should be placed on one side of the highway and all supply circuits should be placed on the other side, so that, as far as practicable, one side of any section of a highway will be available as the signal side and one side as the supply side.

(3) Unnecessary crossings from side to side of the highway should be avoided.

(b) Detailed Location.—(1) Local Signal Lines: Where to be located on the same highway with local supply lines, joint use is generally preferable to separate lines, except sometimes in rural districts and except where the character of circuits involved makes separate lines on opposite sides of the highway more desirable. Where to be located on the same highway with transmission lines, separate lines on opposite

sides of the highway are generally preferable unless a large number of service wire crossings would be involved, in which case, joint use or other arrangements may be preferable.

(2) Toll or Through Signal Lines: Where to be located on the same highway with local supply lines or lower-voltage transmission supply lines, separate lines on opposite sides of the highway are generally preferable, unless a large number of service wire crossings would be involved, in which case, joint use or other arrangements may be preferable. Where proposed for location on the same highway or to follow the same general direction with higher-voltage transmission supply lines, co-operative consideration should determine whether such locations should be used, and if so, what specific co-ordinated methods are necessary. Where to be located on the same highway with higher-voltage transmission supply lines, separate lines on opposite sides of the highway are preferable.

(3) Local Supply Lines: Where to be located on the same highway with local signal lines, joint use is generally preferable to separate lines except sometimes in rural districts and except where the character of circuits involved makes separate lines on opposite sides of the highway more desirable. Where to be located on the same highway with toll or through signal lines, separate lines on opposite sides of the highway are generally preferable, unless a large number of service wire crossings would be involved, in which case joint use or other arrangements may be preferable.

(4) Transmission Supply Lines: Where to be located on the same highway with local signal lines or shorter toll or shorter trunk signal lines, separate lines on opposite sides of the highway are generally preferable unless a large number of service wire crossings would be involved, in which case joint use or other arrangements may be preferable. Where proposed for location on the same highway or to follow the same general direction with longer toll or through signal lines, co-operative consideration should determine whether such locations should be used, and if so, what specific co-ordinated methods are necessary. Where to be located on the same highway with longer toll or through signal lines, separate lines on opposite sides of the highway are preferable.

(5) Avoidance of Overbuilding: Overbuilding of one line by another should be avoided, where practicable. Where necessary for the two kinds of lines to occupy the same side of a highway, joint use is generally preferable to overbuilding.

(c) Other Rights-of-Way. — The foregoing principles, although specifically mentioning highways, should also, when applicable, govern situations involving private rights-of-way near to each other or to highways.

*Deferred General Co-ordination.*—While signal or supply lines when alone should conform to general co-ordinated methods, such lines, pending the incoming or development of the other kinds of lines, may, if deemed economically advantageous, occupy locations or use types of facilities, construction and operating methods other than those conforming to general co-ordinated methods. However, the location and character of such facilities should be altered when and as necessary to conform to these methods upon the incoming or development of another kind of facility conforming to general co-ordinated methods.

*Special Location and Types.*—When co-ordination of supply and signal lines of particular types cannot be technically and economically established under the methods of co-ordination covered by these principles, special co-operative consideration should be given to determining what location and type of construction should be established for each line of such type.

*Definitions.*—For the purpose of these principles and practices, the following terms are used with meanings as defined below:

Inductive co-ordination: The location, design, construction, operation and maintenance of supply and signal systems in conformity with harmoniously adjusted methods which will prevent inductive interference.

General co-ordinated methods: Those methods reasonably available for general application to supply or signal systems which contribute to inductive co-ordination without specific consideration to the requirements for individual inductive exposures.

Specific co-ordinated methods: Those additional methods applicable to specific situations where general co-ordinated methods are inadequate.

Inductive interference: An effect arising from the characteristics and inductive relations of supply and signal systems of such character and magnitude as would prevent the signal circuits from rendering service satisfactorily and economically if methods of inductive co-ordination were not applied.

Inductive exposure: A situation of proximity between supply and signal circuits under such conditions that inductive interference must be considered.

Inductive susceptiveness: Those characteristics of a signal circuit with its associated apparatus which determine, so far as such characteristics can determine, the extent to which it is capable of being adversely affected in giving service by a given inductive field.

Inductive influence: Those characteristics of a supply circuit with its associated apparatus that determine the character and intensity of the inductive field which it produces.

Inductive coupling: The inter-relation of neighboring supply and signal circuits by electric or magnetic induction or both.

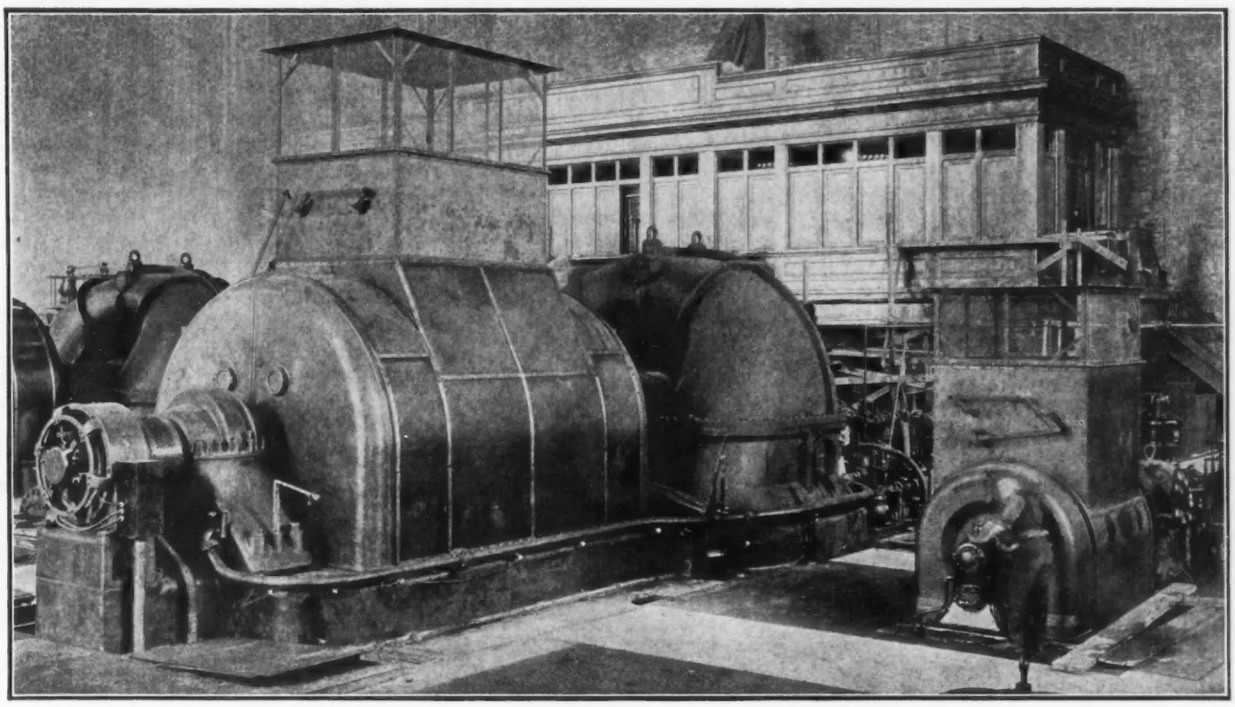
## Lessons Learned from Forty Electrical Fatalities

UNDER the above heading E. S. Whiting of the Liberty Mutual Insurance Company has written a paper in which he considers hazards from low-voltage as well as from high-voltage circuits, asserting that a remarkable number of low-voltage shocks—that is, shocks where the voltage was under 600 and even as low as 110—have proved fatal. The safety engineer, says Mr. Whiting, is interested in the medical question of how electricity kills only as a possible clue to determine what maximum flow of electricity through the body is safe, but this value would be of little actual use if it was known. It is necessary to measure the electrical hazard in terms of voltage since the shock current which flows in case of accident can never be known. It is undoubtedly the amount of current sent through the body and the time it flows that causes the death, but there is no way of tying the voltage and current together quantitatively in shock cases. This is because the other element in the case, the resistance of the shock circuit, is widely variable. This resistance depends on what manner of body contacts are made with the circuit, and these contacts range all the way from a light finger contact with foot contact through dry shoes (thus giving extremely high resistance in the shock circuit) down to a heavy grip of the hand on a switch blade with feet soaking wet in a pool of water (thus giving the other extreme of low resistance in the shock circuit).

The way to prevent low-voltage accidents, Mr. Whiting holds, lies in inclosing all current-carrying equipment to a height of 7 ft. at least above the floor, boxing in all fuse cut-outs, getting rid of bare motor terminals by boxing in or by thorough insulation, replacing open-knife switches by inclosed switches, keeping open wiring out of reach, avoiding the use of drop cords and using safe types of lamp sockets. If extension lamp cords are necessary, the highest grade of reinforced cord with the lamps mounted on wooden handles with porcelain sockets and lamp cages should be employed. In addition, all dead-metal parts of low-tension equipment should be permanently grounded.

# Performance of Equipment and Trends in Station Practice

## Analysis of Turbine Outages and Operating Data for Powdered-Fuel, Diesel and Oil Plants Constitutes an Important Part of the Report of the N. E. L. A. Committee on Prime Movers This Year



MARKED DEPARTURES FROM CONVENTIONAL PRACTICE WERE MADE IN THE STATION OF WHICH THIS GENERATOR IS A PART

The turbine room is next to the river, enabling condensers to draw circulating water through short intakes; practically all the auxiliaries are electrically driven; feed-water is heated by exhaust from house turbines and in emergency by bleeding main units; heat balance is controlled from the balcony overlooking the turbine room; ashes are removed by a hydraulic sluice; flexible facilities are provided for coal handling, and all important steam valves are electrically operated.

DATA on the performance of seventy-eight large turbines, the characteristics of furnace refractories, and experience had with several Diesel-engine, powdered-fuel and oil-fired boiler plants constitute this year an important part of the report of the prime movers committee of the National Electric Light Association, of which H. P. Liversidge is chairman. In addition, however, considerable information of value is given regarding improvement in turbine details, maintaining heat balance, tendency in steam pressures and superheats, prevention of clinker adhesion, water softening and lubrication. In general, the committee points out that station equipment has become virtually standardized except in details.

The data on performance of turbines, which are presented in chart form on another page, were obtained from twenty-seven plants and cover units rated at 20,000 kw. to 45,000 kw. The data give a complete history of each unit from the date of installation, as indicated on the accompanying chart. The weighted performance of the units in these three classes is given in the original report.

The committee states that 100 per cent availability of generating equipment is essential from a service standpoint, but that existing units do not approach this figure and that, generally, it is better to invest money in improving the reliability of existing units than to purchase reserve units.

Improvements in turbines may be noted during the year in two respects: (1) Short-range emergency governors have been placed on the turbines; (2) rotor, disk and blade design features have been improved by the use of better materials and through research work on vibrational stresses.

A decided trend toward feed-water heating from house turbines or from steam bled from the main units is noticeable, and the practice of installing feed-water heating tubes in the main-unit condensers has been discontinued. The other methods offer operating advantages in maintaining a heat balance.

Large boilers are favored in generating-station practice, according to data collected during the last year. The largest boiler installed is in the Congress Street heating plant of the Detroit Edison Company and has a normal rating of 2,982 hp.

There is a continued tendency toward higher pressures, the present maximum being 350 lb. gage with a steam temperature of 700 deg. Fahr. Thirty-six stations now operate at pressures between 225 lb. and 260 lb.; sixteen at between 250 lb. and 275 lb.; six at between 275 lb. and 300 lb. During the year, at Runcorn, England, and at Edinburgh, Scotland, installations were made that operate with steam pressures of 270 lb. and 300 lb. respectively and a total steam temperature of around 700 deg. Fahr.

The A. S. M. E. Boiler Code has now been accepted in whole or in part by seventeen states and eleven cities, according to the chairman of the Uniform Boiler Law Society, and an organization has been formed to bring about uniform methods of boiler inspection.

The high temperatures found in the combustion chamber have necessitated the intensive study of refractories as regards both temperature effects and mechanical strength. The characteristics of some refractories are given in the report.

On the whole, the committee commends the specifications of the Panama Canal Commission for firebrick and calls attention to the tests of the American Society for Testing Materials.

Clinker adhesion is commonly prevented by using perforated firebrick along the clinker line through which air is forced from the stoker air duct. Results are generally satisfactory, but slag may stop the holes in the blocks. Perforated cast-iron side-wall air boxes also have given good satisfaction.

The treatment of feed water is a very important question with most companies, and the committee favors the use of a softening plant in preference to the use of compounds. The use of evaporators solves the feed-water problem, but much corrosion ensues, especially in steel-tube economizers, due to the presence of oxygen in the water.

The past year has been marked by increased attention to auxiliary drive, with particular reference to the type of drive and source of power as affecting heat balance. Reliability of operation is still the first essential in choosing auxiliaries, and where electric drive is used provision must be made for starting the station under emergency conditions. Duplicate equipments are still essential, with auxiliary drive for main units. The house turbine continues to gain in favor as a source for generating electric power and for obtaining all the steam needed for feed-water heating. Variations noted in the installations are: (1) They may be employed in conjunction with other steam auxiliaries; (2) the normal supply may be by electric drive from the house turbine with emergency supply from the main units; (3) part of the drive may be supplied by main units and steam for heating be bled from these units. Theoretically the greatest economy is gained from multiple-stage bleeding of the main unit, but practical operation has limited all the bleeding points to two.

Control of all auxiliaries should, in the opinion of the committee, be placed in the hands of one man, and he should be responsible for maintaining a heat balance at all times.

The problem of ash handling and quenching is still solved by the individual plants in various ways. Submerged ash hoppers, railroad-car conveyors and hydraulic sluicing are among the methods adopted.

Under the auspices of the committee an elaborate series of tests was made on electrically operated gate valves.

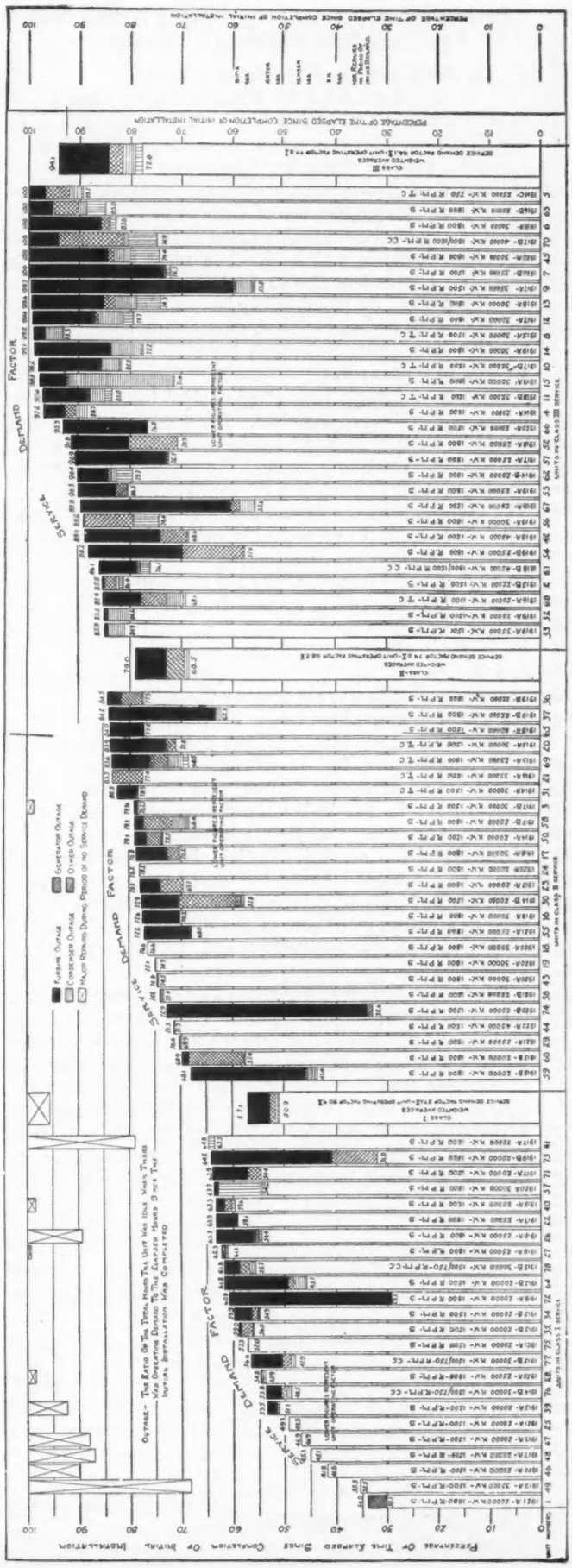
All of the valves under test closed satisfactorily from the standpoint of emergency operation, although some showed more damage to the seat and disk ring than others.

The use of meters for recording data necessary to efficient operation is warranted by the experience of most operating companies. Most of the apparatus which is now on the market has been operated satisfactorily and many new types have been developed during the year.

The aggregate horsepower of Diesel engines is 374,000, with an average horsepower per engine of about 225. The high price of fuel oil leads the committee to say

COST OF OPERATION OF TEN DIESEL ENGINE PLANTS 1921
(Fixed charges, insurance, taxes, etc., not included)

| | Power Plant | | Fuel | | Labor | | Lubricating Oil | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Plant | No. of Engines | Total Hp. of Stations | Quantity in Gallons | Cost | No. of Men | Cost | Quantity in Gallons | Cost | Repairs, Etc. | Total Cost | Kw.-hr. | Cost per Kw.-hr. |
| A | 2 | 340 | 60,529 | $3,389.62 | 3 | $4,742.50 | 630 | $441.00 | $164.88 | $8,738.00 | $563,685 | $0.0155 |
| B | 2 | 530 | 89,408 | 6,180.28 | 3 | 5,065.00 | 922 | 645.40 | 500.00 | 13,319.29 | 778,310 | 0.0171 |
| C | 3 | 980 | 158,823 | 6,688.50 | 4 | 3,950.00 No. mgr. incl. | 2,250 | Price assumed at $0.70 gal. 1,680.00 | Incl. extra parts not yet used 4,016.67 | Incl. some misc. expenses not shown 16,230.17 | 1,514,862 | 0.0107 |
| D | 3 | 330 | 35,040 | 4,242.08 | 2 | 5,064.00 | 989 | 575.45 | Incl. rep. and supplies, overhaul expense and water 121.68 | 10,003.21 | 317,442 | 0.0315 |
| E (6 yrs. results | 2 | 240 | ..... | 13,084.36 | .. | 15,242.60 | ..... | 2,158.24 | Includes waste 6,609.62 Includes repairs to buildings and elec. equipment | 37,094.82 | 1,348,903 | 0.0275 |
| F | 3 | 1,500 | 528,020 | 28,186.07 | 11 | 14,549.17 | 251,832 | 2,012.31 | 25,927.51 | 74,189.08 Includes $368.53 for water and $3,145.49 miscellaneous | 5,833,230 | 0.0127 |
| G | 1 | 165 | 67,490 | 3,978.34 | .. | 1,639.51 | ..... | 1,974.77 Also incl. supplies | ..... | 8,305.62 Incl. $713.80 for maintenance | 680.293 | 0.0122 |
| H | 4 | 2,000 | 606,522 | 57,080.37 | .. | 9,225.79 | 7,046 | 5,464.41 | 16,577.88 | 88,618.09 Includes $269.64 miscellaneous | 6,331,937 | 0.0139 |
| I | ..... | ..... | ..... | 9,922.31 | .. | 10,808.02 | ..... | 1,783.50 | 1,744.27 (Supplies and expenses) | 24,258.10 | 1,898,620 | 0.0127 |
| J | 3 | 1,500 | 413,479 | 20,501.41 | .. | 8,959.00 | ..... | 4,973.23 | 118,773.81 (Maintenance) | 253,814.99 Includes $407.54 miscellaneous | 3,959,033 | 0.0136 |
| | | | | | | | | | | Arithmetical average | | 0.0167 |
| | | | | | | | | | | Weighted average | | 0.0144 |



SERVICE RECORD SINCE COMPLETION OF INITIAL INSTALLATION—SEVENTY-EIGHT TURBINE-GENERATING UNITS, 20,000-KW. TO 45,000-KW. RATING

that Diesel engines must be adapted to the use of low-grade fuel oil to make much progress in power work. The consensus of opinion is that Diesel engines are reliable, have a thermal efficiency as high as 34 per cent and are reasonably quick to pick up load, but that they need care and that maintenance may be high after several years of operation. In ten instances the operating cost runs from $0.0107 to $0.0315 per kilowatt-hour without including taxes, fixed charges, etc. In five instances the cost of maintenance per kilowatt-hour runs from $0.004 to $0.019.

### Fuel Situation Unchanged

Greater use of low-grade coal, fuel oil, pulverized fuel, gas and other alternatives has been strongly advocated, but no marked departures have been made in practice. Isolated tests have been made with lignite with very good results under special conditions. The pulverized-fuel situation is unchanged, although the experience obtained shows it to be practicable for power purposes. The year has seen marked improvements in regard to ash discharge, furnace design and burner design and arrangement. Therefore pulverized coal may be accepted as a practical fire for power-boiler operation. In the United States more than 13,000,000 tons of coal per year is now used in pulverized form under boilers.

With pulverized fuel the subject of byproducts is usually associated from the standpoint of conservation. The general situation is that the extraction of byproducts from coal may become a profitable enterprise where the market value of the byproducts is great enough to offset the cost of processing the coal. Some investigations are under way to determine the best method of producing the byproducts and to ascertain the cost of the process.

Lubrication has been a vital element in operation, and much study has resulted in some definite improvements in methods and in lubricants.

A standard specification for turbine lubricating oil is recommended by the committee, and a tentative outline is submitted.

A noticeable trend toward pressures of around 350 lb. with total steam temperatures of from 800 deg. to 850 deg. Fahr., and even 1,300 deg. Fahr., is contemplated for the future in Europe.

Single-shaft turbine units are available up to 50,000 kw., and a complete design has been made for a 100,000-kw. unit. Closed-circuit cooling is favored in Europe, for the generator, and surface condensers are used in preference to the jet types.

A large number of European engineers favor turbine bleeding for feed-water heating, but three-point bleeding is the maximum used at the present time. For the large plants the economizer and air heater are used in conjunction with the bleeding. The subject of by-product plants is an economic problem which must be solved for European conditions, and great progress is being made.

# Letters from Our Readers

This is a readers' forum. Comments on questions before the electrical industry presenting economic, financial, engineering or commercial aspects and new or supplementary viewpoints on published articles are cordially invited

## Swedish Engineers' Opinion on Lightning Protection

*To the Editors of the* ELECTRICAL WORLD:

After reading the A. I. E. E. midwinter convention reports on lightning arresters I could not help feeling quite astonished at the almost unanimous vote for electrolytic and oxide-film arresters. Leading men here in Sweden believe that lightning arresters for 55-kv. systems and higher voltages are rather superfluous. There is not a single arrester of the aluminum-cell or oxide-film type in use anywhere here, although there are a few private enterprises which use horn gaps with carborundum resistances. I believe most of the big power plants are owned by the state, and in none of these are any lightning arresters used. In fact, in the Trollhättan plants (55 kv., 135,000 kw.) there is a whole shack full of old aluminum cells which were installed about 1910 and thrown out of service soon after, when the people got tired of repairing them.

When the Alukarleby plant was built (1914-15) a whole story with big rooms was reserved for lightning arresters to be installed later. At that time several systems for surge protection were investigated, among others the Campos arrangement, consisting of two choke coils, with a condenser between them grounded through a resistance. While this arrangement was excellent theoretically, it proved too expensive to install. It was finally decided to leave out all arresters and instead provide better insulation on the transformers, particularly on the first few coils. The space reserved for lightning arresters was converted into a high-tension laboratory.

However, choke coils are often used on outgoing lines and a great number of oil breakers are provided with precharging contacts, with appropriate series resistors. Furthermore, all current transformers are protected by 5-ohm "Silit" resistors shunted across their primaries. When designing the insulation the principle of grading was followed, as described in the ELECTRICAL WORLD for Nov. 13, 1920. The line insulators, power transformers and current transformers, being most difficult to repair, are strongly insulated. The busbar insulators form the weakest spot in the system. A surge entering the station will thus discharge over such an insulator, which is very easily replaced.

It is contended that if horn gaps are to be used they must, in order to respond to all dangerous surges, be adjusted for an arc-over voltage much lower than that of the weakest insulation. If so, however, they pick up a lot of smaller surges which would ordinarily cause no disturbance and the horns thus would virtually increase the yearly interruption hours rather than diminish them.

EDY VELANDER.
Vattenfalsstyrelsen, Stockholm, Sweden.

## Forty-Degree Versus Fifty-Degree Rating from an Industrial Engineer's Viewpoint

*To the Editors of the* ELECTRICAL WORLD:

Your editorial headed "A Machine Rating Should Express a Definite Limitation," in the March 18 number of the ELECTRICAL WORLD, was a great surprise to me as it seemed a decided departure from your usual impartial statement of fact and clear-sighted comment. The extremely unwarrantable use of the Power Club's indorsement of the 50-degree motor as an argument for its use certainly demands a protest. You must be sufficiently acquainted with the Power Club to know that a substantial part of its membership has consistently opposed the 50-degree motor, but that, driven by inexorable competition into its manufacture, the club has finally been obliged to indorse it.

The use of "single rating" as applied to the 50-degree motor is merely a euphemism. I feel certain that there would be little objection to making the 40-degree motor one of single rating provided the temperature rise of the motor at full load was 40 deg. rather than 50 deg. The real point of the discussion is not whether a motor shall have a single or a double rating, but whether at full-load continuous operation its temperature rise shall be 40 deg. or 50 deg. C. above the ambient temperature.

The 50-degree rating sprang from three figures fixed by the American Institute of Electrical Engineers in its laudable efforts toward standardization—40 deg. to be taken as the "ambient" or room temperature, 15 deg. as a correction factor expressing the difference between the motor temperature taken by thermometer and the "hot-spot" temperature, and 105 deg. as the maximum safe temperature for impregnated cotton insulation. These are all arbitrary figures. On the maximum safe temperature in particular there was no unanimity of opinion nor does the figure selected represent any physically definite point. Rather, it is a compromised figure to represent a broad section of the curve of temperature and rate of deterioration. The 50-degree rise used as a rating is, of course, the difference between the 40-degree ambient temperature and the 90-degree maximum allowable observed temperature.

There are, however, a great many engineers who feel that for general-utility motors (and these comprise probably 85 per cent of the motors sold) conditions under which the motor will operate are so indeterminate and so variable that a factor of safety should be used between rated motor temperature and the ultimate safe temperature. Factors of safety are used in all other branches of engineering where uncertain limits or indeterminate conditions occur, and their omission in the temperature rating of motors seems most unwarrantable. The 10-degree difference between the 40-degree and 50-degree ratings, together with the factor of safety which the manufacturer must necessarily use to insure his being within his rating, compose the factor of safety implicitly proposed by the 40-degree rating.

In what way, then, does the rating of a 50-degree motor any more express a "definite limitation," or any more uphold "conceptions of genuine standardization," or any less comprise a "subordination of principles of accurate measurement to considerations of commercial expediency," than does that of the 40-degree motor?

PHILIP CHAPIN JONES,
Electrical Engineer.
Goodyear Tire & Rubber Company,
Akron, Ohio.

# Digest of Electrical Literature

**Including Brief Abstracts of and References to Important Articles Appearing in the Scientific and Engineering Press of the World**

## Generators, Motors and Transformers

*Remarks on the Rupturing Speed of Oil Circuit Breakers.*—G. LONGUE.—The author describes a simple method to determine the mechanical speed with which an oil circuit breaker opens its contacts. A cylindrical drum upon which a time curve is drawn by the pointer of an electrically operated tuning fork is fastened to the main shaft of the breaker. If such a timing device is not available, the metallic registering drum may be covered with a wet strip of blueprint paper, an iron stylus used as pointer, and between the drum and the pointer an alternating current of known frequency and about 30 volts potential applied. This arrangement will, if the drum is rotated quickly, produce blue dashes, separated by blank spaces. Knowing the radius of the registering drum, the length of the operating lever and the frequency of the tuning fork or the alternating current, it is easy to calculate the average speed of the breaker mechanism. A curve may then be plotted between time and speed which will give the speed of the switch at each desired point. The author claims that the usual design of spark-breaking auxiliary contacts is unsuitable, because their shape causes such a rapid displacement of oil as to form a momentary vacuum, which is likely to reignite the arc. Such contacts should be tapered to an upper point or edge, so as to cause the smallest possible amount of eddying in the oil, instead of having the more or less ball-shaped form which is given to them in most switch designs.—*Revue Générale de l'Electricité*, March 11, 1922.

## Lamps and Lighting

*Flashlamps and Flashlight Batteries.*—EUGENE H. MATHEWS.—The development of the flashlamp, first manufactured twenty years ago, is discussed. At the present time there are four classes of flashlamps in use. These are tubular, lantern-type, vest-pocket, spotlight or projection flashlamps. The development of the spotlight type is treated at length. Two factors made possible the economical use of the flashlamp—first, the introduction of the tungsten filament and, second, the development of the flashlight battery cell. Statistics are presented comparing the sales of flashlamps and flashlight batteries in the last year with those of other standard electrical appliances and specialties.—*Transactions of Illuminating Engineering Society*, March, 1922.

*Remote Switch Control for Street Lamps.*—L. MAAS.—It is feasible and permissible to increase momentarily the gas pressure in the pipe lines of illuminating-gas systems. This principle has been actually used to light and to extinguish street lamps from the gas plant. On the same principle can be based a remote control of electric street lamps. It is only necessary to provide for certain groups of lights a switch box which contains a funnel-shaped casting, connected to the gas line and covered with an elastic membrane. An increased gas pressure will cause this membrane to bulge out, and this motion will operate a mercury-tube contact, which in turn closes or opens the street-lighting circuit. A ratchet motion may be introduced between the membrane and the contactor to make the mechanism selective, so that half-night or full-night lamps may be switched on and off at will. A gas-electric remote-control system of this description is in successful operation in Nürnberg, Bavaria.—*Elektrotechnische Zeitschrift*, April 6, 1922.

## Generation, Transmission and Distribution

*Interconnection of Small Hydro-Electric Plants.*—A. SOULIER.—Frequently small mills not more than 6 miles from one another along the same river have individual electric plants. In times of low water or accident no emergency supply from the adjoining plant is possible. For such plants the author suggests a novel system using 500-volt direct-current generators with two slip rings from which alternating current may be derived at the same time. The plants would be connected with a double-wire 500-volt direct-current line. The local illumination would be supplied from an auto-transformer, fed from the two slip rings, and the motive power would be taken from one generator brush and the middle of this auto-transformer at 250 volts.—*Revue Générale de l'Electricité*, Feb. 11, 1922.

*Synchronous Operation of Alternators Through Capacitance.*—T. NISHI.—The author of this article discusses the phenomenon of the mutual synchronizing action of two circuits which are in close parallel. The theory of this action is clearly explained and the conclusion is drawn that of two arrangements of two transmission circuits in physical parallel that one is the better in which the conductors of the same phase do not occupy the same relative position on the towers but rather diametrically opposite positions.—*General Electric Review*, March, 1922.

## Traction

*Rotary Converters, with Special Reference to Railway Electrification.*—F. P. WHITAKER.—The author takes up the limiting factors that affect the design of converters. The most important of these is the maximum voltage that can exist between adjacent commutator segments. The author describes a machine so constructed that upon short-circuit and resulting flash it cannot draw the flame in between the armature and field coils.—*Electrician (London)*, March 3, 1922.

*Italian Single-Phase Road in the Brembana Valley.*—C. BRODBECK.—This electric road has been in operation since 1907, but owing to a great increase in traffic a number of more powerful locomotives of the B-B type have recently been put in service. The line is 30 km. long, with standard gage. It is operated from its own power station, which has an equipment rated at 1,500

kva., single-phase, and 6,000 volts, with a frequency of 25 cycles. The new locomotives are rated at 400 hp. and are driven by two single-phase, series-commutator motors of 200 hp., operating at 550 r.m.p., with gear and horizontal-rod drive. The locomotive transformer is of the dry type with forced-air cooling. Carbon-filament lamps are used to illuminate the trains, and they give satisfactory light at 25 cycles.—*Brown-Boveri Mitteilungen*, March, 1922.

### Installations, Systems and Appliances

*Electric Motor Starters.*—J. ANDERSON.—The author deals with the development of an electric motor starter from the basic principles, defining what is meant by starting, accelerating and using torques and referring to the lack of data regarding starting conditions. After giving a means of estimating the accelerating time and torque, he considers the application of these facts to step-by-step starters.—*Electrician (London)*, March 24, 1922.

*Method of Selecting Gearing for Motor-Driven Cargo Hoists and Winches.*—J. A. JACKSON.—In determining the gearing for motor-driven hoists and winches it is best practice to base calculations on the average load to be handled, making the rope speed for this load the maximum that is consistent with safety and accurate control. The speed at rated load and overload will then depend upon the speed characteristics of the motor. The author shows how to calculate the proper gearing for hoists and winches when driven by constant-speed and variable-speed motors.—*General Electric Review*, March, 1922.

### Electrophysics and Magnetism

*Contact Difference of Potential and Thermionic Emission.*—O. W. RICHARDSON and F. S. ROBERTSON.—In this theoretical discussion the authors confirm the relation that exists between the contact potential between two surfaces at a given absolute temperature and their thermionic electron saturation currents per unit area at the same temperature. The experiments carried out were made with a thoriated tungsten filament.—*Philosophical Magazine (London)*, March, 1922.

*Cracking in Condenser Tubes.*—H. MOORE and S. BECKINSALE.—The paper gives the result of investigations of low-temperature annealing applied to condenser tubes. This work consisted in the examination of split condenser tubes, the determination of the properties of condenser tubes made by various manufacturers, experiments on condenser tubes purposely made by methods having high internal stress, a study of the rate of reduction of stresses in condenser-tube brass during low-temperature annealing, and the determination of the effect of heat treatment, in a range from 200 deg. to 325 deg. C., on the properties of brass condenser-tube composition.—*Engineering (London)*, March 17, 1922.

### Electrochemistry and Batteries

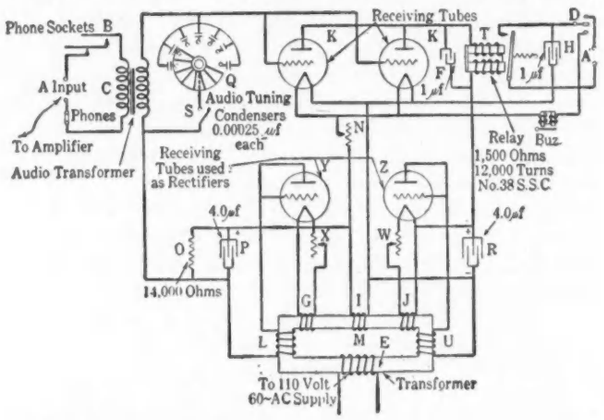
*Effects of Impurities on Electrolytic Zinc.*—G. D. SCHOLL.—Investigations were carried out to determine the effects of impurities on the cathodes in commercial cells used in the production of electrolytic zinc. These tests were made after the addition to the electrolyte of one or two parts per million of arsenic, antimony, cobalt, copper, nickel and glue. The results brought out the fact that, as a general rule, impurities within reasonable limit do not attack the zinc deposit very vigorously during the first fifteen or twenty hours of deposition. Although it has been shown that the action of cobalt is catalytic, it appears from the test that either there is likewise preliminary concentration before the catalytic action starts or the impurity is changed into another state before the corrosion begins. Thirty-eight photographs are included, showing the effect of the impurities.—*Chemical and Metallurgical Engineering*, March 29, 1922.

### Units, Measurements and Instruments

*Standard Practice in the Testing of Line Insulators.*—C. L. KASSON.—This article explains the methods used both in the laboratory and in the field for testing insulators before acceptance and while in service. Among the methods of testing are the flashover, electrostatic capacity and stress distribution tests.—*Electrical Record*, April, 1922.

### Units, Measurements and Instruments

*A Relay Recorder for Remote Control by Radio.*—F. W. DUNMORE.—This paper describes the development and the operating principles of a type of relay recorder which is designed to operate from the output terminals of a radio receiving set and which may also be operated by any other source of audio-frequency




ALTERNATING-CURRENT RELAY RECORDER OPERATED BY RADIO

signal. By its use any electrically controlled mechanism may be operated. Two types are described. One receives its energy from batteries, and the other, a diagram of which is shown in the accompanying illustration, from any 60-cycle, 110-volt lighting circuit. This feature makes this type simple and inexpensive to operate, durable and practical. Curves and diagrams are shown illustrating the principles of operation—*Journal of the A. I. E. E.*, April, 1922.

*Low-Voltage Rectifier Design.*—R. D. DUNCAN.—An article on the theoretical and practical aspects of low-voltage rectifier design when employing the three-electrode vacuum tube. The author considers the percentage amplitude or "ripple" voltage overload resistance, determination of the voltage consumed by the rectifier tube, voltage regulation and the current and power delivered by transformer secondary.—*Radio Review*, March, 1922.

### Miscellaneous

*Reinforced Concrete in Power-Station Construction.*—A description of the use of reinforced concrete in building power houses, transformer houses and cooling towers as applied to central-station design in England. This type of construction is one of the solutions for the problems involved in the increasing size of foundations required with modern electrical equipment.—*Electrical Times*, Feb. 9, 1922.

# Scientific and Industrial Research

(PRINTED IN THE THIRD ISSUE OF EACH MONTH)

**A Department Devoted to Reports of Investigations Contemplated or Completed, Research Facilities Available, and Suggestions for Co-operative Work.**

*Conducted by* PROF. VLADIMIR KARAPETOFF
Cornell University, Ithaca, N. Y.

## Research in Progress and Completed

[When investigations which have been completed are, in the opinion of the editors, of wide enough interest to the field we serve, details thereof will be presented in other parts of this paper. Contemplated research or that which appears to have limited appeal will be only briefly reported in this section, but details may be had by communicating with the investigator or institution named in the report. Readers are referred to the department "Digest of Electrical Literature" for investigations reported in other journals. The news and engineering sections should also be followed for research reported before technical societies.]

OVENS, ELECTRIC, AUTOMATICALLY REGULATED.

A series of observations on two different types of incubating, drying and sterilizing ovens has been in progress for some months to determine (1) variation in temperature with time at any given point and (2) temperature distribution in the oven at any particular time. The ovens are electrically heated and automatically regulated. A valuable byproduct of the study has been the information obtained on electric thermo-regulators, particularly on the behavior of contacts which operate very slowly. As a result of the work the designs of the ventilating system of the oven and of the wiring arrangements have been so improved that closer approach to temperature uniformity, both in time and location, seems impossible without forced ventilation.—*Paul E. Klopsteg, Central Scientific Company, Chicago.*

CIRCUIT BREAKER, SELF-RECLOSING.

A European manufacturing company has developed a simple automatic arrangement for reclosing an oil circuit breaker. It consists of a raised weight acting upon the handle of the circuit breaker and held by a simple mechanical lock. When the circuit breaker trips, the lock is released after about thirty seconds and the falling weight closes the breaker again. Should the short circuit still exist, the breaker opens again, this time without being reclosed. On branches without attendance this device saves many long interruptions in service due to transient disturbances.

OIL SWITCHES, TESTING OF CONTACTS.

A large current is sent through the switch by means of a current transformer. If the pointer of a voltmeter, connected across the switch, moves rapidly to a high reading, an imperfect switch contact is indicated. A low reading gives assurance of the proper functioning of the contacts and thus saves an expensive dismantling and inspection.—*Charles Miller, Rochester, N. Y.*

MAGNETIC MEASUREMENTS ON SMALL SAMPLES.

To reduce the expense incurred in research requiring magnetic measurements of materials, new apparatus has been constructed by means of which it is possible to make reliable measurements on smaller samples (10 cm. long and 6 cm. in diameter). This work is not yet complete but already the results are very satisfactory.—*Bureau of Standards, Washington, D. C.*

CABLES, OPERATING TEMPERATURE OF.

An arrangement has been made with the Massachusetts Institute of Technology to conduct tests on the maximum possible operating temperature for paper-insulated, lead-covered cables. The institute furnishes the laboratory facilities, the supervision and instruments, while the committee pays the salary of research assistants and also furnishes the necessary samples of cable. Sufficient funds have been appropriated to insure the success of the plan.—*Underground Systems Committee of the N. E. L. A.*

ALTERNATORS, PROTECTION OF.

The committee has brought up to date the subjects of temperature indicators on generators, fire protection for generators, recirculation of air for cooling and differential relay protection. Consideration has also been given to control systems, excitation systems, stability of exciters and generators, grounding of generator neutrals, electrically driven auxiliaries and high-voltage testing sets.—*Generating Stations Committee of N. E. L. A.*

MOTOR, INCLOSED, WITH AXIAL VENTILATION.

A line of completely inclosed induction motors has been developed, with ventilating openings in the stator, parallel to the shaft. The air draft is created by a fan with a labyrinth packing which absolutely prevents dust or dirt from entering the space occupied by the windings. In this manner the advantages of a completely inclosed motor are combined with small size and weight due to forced ventilation.—*George Lewinnek, Berlin, Germany.*

CORROSION OF CAST IRON.

Two cells were so constructed as to provide two pieces of cast iron not in contact with each other, but both in contact with moist soils, the anode being in contact with lining silt and the cathode in contact with a clay soil, both soils being kept moist. The results show that some soils, when in contact with iron, can of themselves set up an appreciable emf., like that of a primary battery, amply sufficient to decompose the iron.—*W. Nelson Smith, Winnipeg Electric Railway, Winnipeg, Canada.*

HEAT, DISSIPATION OF, FROM PLAIN AND BLACKENED BRASS SURFACES.

The heat dissipated in still air from plain brass and blackened brass surfaces has been determined for various temperature excesses up to 140 deg. C. Curves were plotted showing the total losses for each surface. Relationships have also been derived showing the loss due to radiation and convection respectively.—*T. S. Taylor, East Pittsburgh, Pa.*

STEEL, MAGNETIC TEST OF MECHANICAL PROPERTIES OF.

The material used in tire chains must have a hard outside shell to resist wear and also a tough central core to stand severe shocks. Mechanical tests and a microscopic examination of the break are slow and unsatisfactory. A successful magnetic test has been devised in which a 60-cycle inductance bridge is used. The sample under test serves as the core of one of the inductances under comparison, and, with a proper setting, the galvanometer deflection is an indication of the mechanical properties to be expected of the sample.—*A. V. de Forest, Bridgeport, Conn.*

TELEGRAPH RELAY, HIGH-SPEED.

The tongue of the relay is composed of a stiff spring with a soft-iron armature on its end. The natural period can be made considerably above that of the succession of impulses whose record is sought. The tongue is permanently magnetized—by a magnet or local current—and is normally held in a distorted position. The line impulse releases the tongue. The local circuit is closed through a moving chemical strip which records the instant of contact. This relay has been tested as an element of a telegraph receiver which prints in roman characters. For a speed of transmission of 600 words a minute over a 400-mile line each relay has a natural period of about 190 cycles, which is much higher than is needed. The speed of transmission is entirely controlled by the characteristics of the line and is in no way limited by the terminal apparatus.—*Carl Kinsley, Ithaca, N. Y.*

PHOTOMETER, SPHERE, FOR MEASUREMENT OF REFLECTION AND TRANSMISSION FACTORS.

A new method has been developed of using the sphere (or Ulbricht) photometer for measuring the reflection factor of surfaces. It consists in a combination of the sphere with the Martens polarization photometer, which enables a direct comparison to be made between the brightness of the sphere wall and that of the test surface which closes an aperture in the sphere.—*Enoch Karrer, Bureau of Standards, Washington, D. C.*

CABLE, SUBMARINE, TELEPHONE, TRANSMISSION CHARACTERISTICS OF.

Considerable uncertainty is introduced into the theory of such a cable because of the contribution of sea water and armor wires to the effective resistance and inductance of the circuit. A mathematical investigation has been made of the influence of sea return, and the results have been checked with experimental data. Means have also been found for diminishing this effect. —*J. R. Carson, American Telephone & Telegraph Company,* and *J. J. Gilbert, Western Electric Company, New York, N. Y.*

## Suggestions for Research

CONDENSERS, PAPER FOR.

With the increasing use of static condensers for power-factor correction in motor installations, the question of permanency of such condensers acquires a new importance. The paper used in their insulation sometimes has weak spots which later lead to punctures. It is desired (a) to improve the quality of the paper, (b) to devise a convenient factory test for detection of weak spots, (c) to develop a method for repairing the spots rather than discarding a particular sheet of paper.

FLASH-OVER, EFFECT OF NATURE OF SURFACE UPON.

Systematic laboratory experiments are desired on flashover distances and voltages over plane surfaces of different insulating materials, both clean and covered with soot, dust, moisture, oil, paraffine, etc. The details of the physical nature of the arc should also be determined. The results will be of great value in the design and in the operation of high-tension apparatus.

INSULATORS, EFFECT OF SALT-WATER FOG ON.

In localities exposed to salt-water fog it is necessary to use larger insulators in order to reduce the occurrence of flashovers. It is desired to find a general relationship between the safe voltage rating of insulators in a dry climate and under salt-fog conditions, this relationship to extend from the lowest to the highest voltage in use or proposed.

CORONA ON PORCELAIN, ITS EFFECT ON DUST AND FOG.

In localities subjected to dust or sea fog the lower surface of insulators presents a special problem in that the deposits are not washed off by the rain. It has been suggested that this surface be so designed as to have parts which in normal operation run at a corona voltage, and thus tend to repel the particles of fog or dust.

SUBSTATIONS, AUTOMATIC.

One of the features of operation of revolving machinery in automatic substations, where the current demand frequently drops to a small value, is the corresponding stopping and starting of these machines many times a day. The resulting waste of energy and depreciation of apparatus more than offsets the saving in power while running idle. It is desired to develop a control system which will keep these machines running unless the period of light load is of considerable duration.

INSULATORS, FLASHOVER EFFECT OF FREQUENCY UPON.

It is becoming increasingly common to test power insulators for flashover with high-frequency apparatus. The question has been raised as to whether or not a given insulator would give the same flashover at a low as at a high frequency, and experiments on the effect of frequency are desired.

CURRENT TRANSFORMERS FOR RECORDING TRANSIENTS.

With the ever-increasing experimental study of transient electrical phenomena, particularly in large high-tension transmission systems, the question of reliability of current transformers for such purposes is becoming of considerable importance. It is desired to investigate theoretically and experimentally the errors involved with transient phenomena and to design a special measuring transformer in which such errors are reduced to a minimum.

# News of the Industry

**Chronicle of Important Events and General Activities in the Technical, Commercial and Manufacturing Fields With Announcements and Reports of Association Meetings and Conventions**

## Young and Swope Succeed Coffin and Rice as General Electric's Executives

A BROADENING of the engineering and research service of the General Electric Company and an increase of its prestige here and abroad are forecast by a number of important changes in the directorate of the company which have just been officially announced.

O. D. YOUNG

Following a meeting of the board of directors held in New York May 16, Charles A. Coffin retired as chairman and was succeeded by Owen D. Young, long associated with the company as vice-president. The position of president was filled by the election of Gerard Swope, president of the International General Electric Company, who succeeds E. W. Rice, Jr. Mr. Rice requested to be relieved of the duties of organization and management and allowed to devote his entire energies to the further upbuilding of the scientific, engineering and technical phases of the company's work in the broadest sense, and he will become honorary chairman of the board of directors. Anson W. Burchard, for many years identified with the company as vice-president, with particular reference to public utilities and foreign investment, was elected vice-chairman of the board. J. R. Lovejoy, vice-president in charge of sales, was elected a director, as was also G. F. Morrison, vice-president.

Particular significance is attached to the action of the board of directors in the creation of the position of honorary chairman, which will be filled by Mr. Rice.

Mr. Coffin, the retiring chairman of the board, will continue, as a director, to give attention to the problems of the company. He has been for forty years a leading influence in the development of the corporation and was founder and creator of the company and its predecessor, the Thomson-Houston Company.

Mr. Young, the new chairman of the board, is a lawyer by profession. He was born in Vanhornesville, N. Y., Oct. 27, 1874. He is a graduate of St. Lawrence University and the Boston University Law School. In addition to his interest in the General Electric Company he is chairman of the board of directors of the Radio Corporation of America and a director of the Electric Bond & Share Corporation, the Bankers' Trust Company and many other organizations.

Mr. Swope, the new president, has both an engineering and a commercial training. He was born in St. Louis, Mo., Dec. 1, 1872, received his elementary education in the local public schools and was graduated from the Massachusetts Institute of Technology in 1895. That fall he entered the employ of the Western Electric Company. Starting from the bottom in the shops at Chicago, where he was first assigned, he worked his way up department by department to an executive position. His first promotion was to the power apparatus engineering department as designing engineer. Next he organized and was first manager of the company's St. Louis house, opened in 1901. Four years later he was called back to Chicago and made manager of the power apparatus department. When in 1908 the company went out of the power apparatus field Mr. Swope was transferred to New York as general sales manager, and in 1913 he was elected vice-president. This connection he severed Jan. 1, 1919, to become president of the International General Electric Company.

GERARD SWOPE

E. W. RICE, JR.

## Baekeland Patents Sustained

THE Redmanol Chemical Products Company has made a settlement in the recent action instituted by the General Bakelite Company against the General Insulate Company for infringing on the use of "Redmanol." This action, though brought against its customer, was defended by the Redmanol company. Judge Chatfield rendered a decision sustaining the Baekeland patents, covering broadly the combination of phenol condensation products with fiber and fibrous materials and the simultaneous use of heat and pressure in the manufacture of articles from these products. The Redmanol company has now consented to the decree and has paid heavy damages in liquidation. It will henceforth manufacture under license.

## Byllesby to Increase Capacity 32 per Cent

THE 1922 construction plans of the Byllesby Engineering & Management Corporation contemplate additions to its entire electric generating capacities averaging around 32 per cent. These additions will be much greater than in any previous single year in the development of this company. A total of 110,000 hp. in generating equipment will be placed in service or put under construction. Of this total 27,000 hp. will be installed in the new hydro-electric development of the Western States Gas & Electric Company of California. The principal other additions now under construction are as follows: The San Diego Consolidated Gas & Electric Company, San Diego, Cal., is installing a 20,000-hp. unit; the Northern States Power Company, Sioux Falls, N. D., an increase of 4,000 hp.; the Red River Power Company, Grand Forks, N. D., a 2,360-hp. unit, and the Ottumwa (Iowa) Railway & Light Company a 4,000-hp. addition.

The Mobile (Ala.) Electric Company has increased its power capacity by 5,000 hp. since it obtained a long-term lease of the 10,000-hp. plant recently built for the Chickasaw Shipbuilding & Car Company.

## Secretary of Federal Power Commission Attacks Ford Offer

FINAL stages are being reached in the House military affairs committee in Washington on the offers of Henry Ford, the Alabama Power Company and others to purchase or to lease and develop the government's Muscle Shoals projects. The Senate committee on agriculture and forestry has adjourned for the time being to prepare for a new group of witnesses, among them William H. Onken, Jr., editor of the ELECTRICAL WORLD, who will be called upon to comment on Senator Norris' own bill for a government owned and operated corporation to complete the water-power projects and produce explosives and fertilizers. The other witnesses in this group are expected to be experts, either for or against, on government ownership and operation.

In the House committee, as this is telegraphed from Washington, a bitter fight is taking place on a motion made by Representative McKenzie of Illinois to reconsider a vote passed last week by the narrow margin of eleven to ten under which approval was given to the idea that in case Congress decided to make a bargain with Mr. Ford it would or might be possible for him to obtain possession of the government's interest in the Gorgas plant of the Alabama Power Company on the Warrior River, provided that Mr. Ford would agree to defend any suits against the government arising from such a situation and pay any damages. Little real progress, however, has been made by the House committee in the past week beyond the adoption of a fertilizer guarantee which it is not believed Mr. Ford will accept; but there are signs that a report will soon be forthcoming from the committee very soon.

In the Senate committee hearings the principal witness was O. C. Merrill, executive secretary of the Federal Power Commission. Mr. Merrill opposed the hundred-year-lease period, asked by Mr. Ford in particular, saying that under the federal water-power policy the fifty-year policy should be adhered to. He criticised Mr. Ford's offer in every respect, characterizing it as an "unconscionable subsidy" not only for fertilizers but for his private operations as an automobile manufacturer.

If Mr. Ford's offer were accepted by Congress, Mr. Merrill said, after using 100,000 hp. for nitrate operations, "there would be left for Mr. Ford's private use 360,000 hp. of the cheapest power in the United States, not excepting Niagara, for the simple reason that Mr. Ford would pay only a part of the cost of that power and the rest of it would be paid for out of the United States Treasury."

Mr. Merrill testified that from every practical standpoint the offer of the Alabama Power Company is more favorable to the United States than any other bid made.

## J. E. Aldred Negotiates Purchase of Water Powers in North Italy

BETWEEN $25,000,000 and $50,000,000 will, according to a special dispatch from London to the New York *Times*, confirmed at the New York banking office of J. E. Aldred, be the utlimate investment by American capitalists in well-known water-power and electric light and power companies operating in the industrial areas of northern Italy. Mr. Aldred, who is now on his way back from Italy, has been the chief factor in bringing these companies under American control.

The companies, centering in Milan, Venice and Turin, are among the most important factors in the industrial situation in Italy. They supply electric light and power to these cities and the adjoining territory, and, through the development of large water powers to the north of these districts obtaining their supply of water from the Alps, they command an amount of electrical energy which, applied to industrial operations, may make this section one of the chief industrial areas in Europe.

Mr. Aldred has been intimately concerned with the development of water power in Pennsylvania and in Canada. He is the president of the Shawinigan Water & Power Company of Montreal and chairman of the board of the Pennsylvania Water & Power Company, which has 83,500 kw. installed at Holtwood, on the Susquehanna River. The Consolidated Gas, Electric Light & Power Company of Baltimore, of which also Mr. Aldred is chairman of the board, derives part of its energy supply from Holtwood. Engineering representatives of the Aldred organization are now in Italy working out practical details, while the financing, says the New York *Times* correspondent, is being arranged in New York and London.

## A. M. E. S. Plans for Its June Meeting

A PARTICULAR feature of the annual gathering of the Associated Manufacturers of Electrical Supplies, which is to be held at the Essex and Sussex Hotel, Spring Lake Beach, N. J., during the week beginning June 19, will be a special members' meeting for the discussion of such technical and other subjects of common interest as may be presented by the sections or by individual members. The general standards committee will hold an important meeting on Monday afternoon, June 19, in preparation of recommendations to be made to the sections. The section meetings will be held at convenient hours during the week on a schedule to be arranged. The annual meeting proper, postponed from March, will be held on Thursday, June 22.

## A. S. M. E. Discusses Boilers, Welding and Fuel at Atlanta Meeting

MANY technical papers of interest to electrical engineers were presented before the spring meeting of the American Society of Mechanical Engineers, held at Atlanta, Ga., on May 8 to May 11. Dr. Johann Stumpf of Charlottenburg, Germany, the inventor of the "Unaflow" engine, contributed, with C. C. Trump, a paper on "Exhaust Energy in Reciprocating Engines" which suggested the use of the residual energy due to incomplete expansion to reduce the counter pressure by the employment of eduction nozzles.

Alfred Cotton's paper, "Accuracy of Boiler Tests," was a plea to give up pretenses to impossible exactness. He held that it was absurd to report the heat-balance figures of a boiler test closer than the nearest tenth of 1 per cent. Arguments were presented to show that the efficiency obtained from a twelve-hour test on a coal-fired boiler might be in error by 3 or 4 per cent.

A paper on the "Reduction of Fuel Wastes in the Steel Industry," by F. G. Cutler, gave a survey, in the form of a heat balance, of the heat required and produced by the various operations in the manufacture of iron and steel.

E. A. Uehling, in his paper on the "Control of Boiler Operation," said that the pound of coal would probably continue to be the commercial fuel unit but was most unsatisfactory as a control unit. The pound of combustible was a more satisfactory unit, but even this allowed of considerable variation in the heat value. After a careful study of the hundreds of analyses published by the government, Mr. Uehling strongly recommended the use of the pound carbon fuel unit as giving a practically constant heat value. He then proceeded to develop a practical system of figuring the percentage of losses and of dividing these losses to show the proportions due to various avoidable causes.

C. W. E. Clark presented a paper on "Boiler-Room Performance and Practice at the Colfax Station of the Duquesne Light Company," and R. H. Heilman one on "Heat Losses from Bare and Covered Wrought-Iron Pipe at Temperatures Up to 800 Deg. Fahr."

There were papers from Charles G. Adsit on "Power Development of the Southeast," by C. A. Mees on the "Economies of Water-Power Development," and by John A. Sirnit on "Hydro-Electric Power-Plant Design." H. B. Reynolds and W. F. Hovey presented by title only a report previously made to the Metropolitan Section upon "Efficiency Tests of a 60,000-kw. Cross-Compound Triple-Cylinder Steam Turbine." Mr. Adsit's paper is noted in another column. Mr. Mees gave a broad outline of the economic and business considerations involved in the financing, construction and operation of complete hydro-electric systems. Mr. Sirnit dealt almost entirely with the use of the backwater suppressor in hydro-electric plants. In many such plants there is a serious loss of head during the flood seasons on account of the rise in the tailwater level. O. G. Thurlow, chief engineer of the Alabama Power Company, conceived the idea of using the water running over the spillway to push back the tailwater and thus reduce the negative head on the discharge of the draft tube. The paper described various preliminary experiments as well as the application of the Thurlow backwater suppressor in connection with the new Mitchell Dam project of the Alabama Power Company.

Under the joint auspices of the boiler code committee and the American Welding Society a symposium on welding was held. R. J. Roark contributed a paper on the "Strength of Electrically Welded Pressure Containers," S. W. Miller one on "Some Principles of the Construction of Unfired Pressure Vessels," F. N. Speller one on "Steel for Forge Welding" and E. A. Fessenden and E. J. Bradford one on "Facts on Welded Cylinders." That the most important considerations in the uniform production of welds of high efficiency are "suitable material, well-trained operators and adequate facilities for control of the work" was the conclusion reached by Mr. Speller.

The committee on nominations reported as the official ticket these nominees, who will be elected by mail ballot and take office after the December meeting in New York City: President (unanimously chosen), John Lyle Harrington of Kansas City, Mo.; vice-presidents, W. S. Finlay, Jr., of New York, William H. Kennerson of Providence, Earl F. Scott of Atlanta, and H. H. Vaughan of Montreal; managers, A. G. Christie of Baltimore, James H. Herron of Cleveland and Roy V. Wright of New York; treasurer, William H. Wiley of New York.

## Mr. Adsit Attacks Muscle Shoals as a Source of Power

THE contention that the public has been fooled in regard to the Muscle Shoals development and that the Southeastern States have many undeveloped water-power sites that can be exploited on a commercial basis to much better advantage was made last week by C. G. Adsit of Atlanta, executive engineer of the Georgia Railway & Power Company, who spoke before the power session of the convention of the American Society of Mechanical Engineers, held in the city just named. Mr. Adsit's subject was "Power Development in the Southeast."

"It is a source of considerable regret to engineers who are familiar with the Tennessee River to read in the press of the enormous power allotted to the Muscle Shoals development, usually stated as 1,000,000 hp., and the consequent misleading of the general public on this much discussed subject," he said.

Mr. Adsit brought to the attention of the engineers the fact that hydro-electric power connected to a high-tension transmission line linking together the five Southeastern States represents 17.75 per cent of the total water-power development of the United States.

## Another Muscle Shoals Proposal

SENATOR NORRIS of Nebraska has introduced by request a bill for operation of the Muscle Shoals (Ala.) nitrate plant under an incorporated Federal Chemical Corporation, the bill having been prepared by ex-Representative Lloyd of Missouri. The proposed corporation would continue for fifty years and would have seven directors, of whom three would represent the government by selection of the Secretaries of the Treasury, War and Agriculture. Offices of the corporation would be at Muscle Shoals, Ala., and the District of Columbia, and it would have $5,000,000 stock divided into 50,000 shares. The bill provides that the corporation may lease from the government the Muscle Shoals project for fifty years.

## Bill to Prohibit Tax Exemption of Securities Strongly Opposed

DESPITE efforts to delay the consideration of legislation to prohibit the tax exemption of securities, the joint resolution favoring such a law recently approved by the ways and means committee will be brought to a vote in the House of Representatives in the near future. It is believed that the resolution will pass, but a hard fight is in prospect. The principal arguments being advanced against the legislation are that it will make it difficult to a prohibitive degree for states and cities to sell their securities and that it will increase the rate of interest that farmers will have to pay for loans. Some members of the House hold that it will virtually preclude municipal operation of public utilities.

On the other hand, those favoring the legislation contend that the stability of the government is being undermined by a system which permits the wealthy to pay a much smaller comparative proportion of the taxes than do those less able to pay. While industry as a whole suffers very seriously because it is denied the use of large sums which can be invested more profitably in tax-free securities, the privately owned public utilities suffer most, friends of the resolution point out, because they cannot compete with publicly owned competitors whose bonds are tax-exempt. A majority of the committee on ways and means voted to recommend the legislation and gave eight reasons why the issuance of tax-exempt securities should be condemned. These reasons are: A large proportion of property escapes taxation, causing a great loss of revenue; it violates the ability principle of taxation and discriminates unfairly between taxpayers; it impedes private financing; it discourages investment in new enterprises; it encourages extravagances of governmental agencies; it grants a private subsidy to certain interests; by withdrawing money from private enterprises it increases the rate of interest required for all enterprises not carried on by the government and thereby adds to the cost of living; it creates social unrest.

## Hoover Takes Hand in Coal Strike

CONSUMERS are not to be mulcted in the matter of coal prices if the Washington administration can help it. Statements to that effect were made this week at the White House and in a formal statement issued by Secretary of Commerce Hoover, who said:

"The tendency of coal prices to rise at the mine in certain districts will be checked. In order to devise measures for the protection of consumers, I have called a meeting of representative operators from the different producing fields for consultation, and I have been assured that they will co-operate to prevent speculation and rising prices.

"I have also requested the American Railway Association to consider the creation of a buying committee for railway coal and have made the same request of the public utilities associations. I shall ask that certain other large consuming industries undertake the same measures in order that we may stop their bidding against each other and against the general consumer.

"At the present time the price of coal has risen unduly in certain districts, while in other districts there is an insufficiency of orders to employ the mines full time. There are very large stocks of coal in the country in the possession of consumers, and the problem is one of co-ordination and co-operation. The reports of certain wholesalers that there is a shortage of coal are untrue and designed to further their personal ends."

## Radio Equipment and Fire Insurance

CALLING attention to the fact that fire insurance regulations governing the installation of radio apparatus are to be revised, the Bureau of Standards warns owners of such equipment that unless these rules are observed the rates on their properties may be raised or the insurance refused entirely. The new rules are being considered by a committee of the National Board of Fire Underwriters, and the Department of Commerce has prepared a mimeographed circular containing tentative requirements which have been suggested for adoption. This circular (Letter Circular 62) may be had from the Bureau of Standards, Washington, D. C.

## Sale of Salt River Power Approved by Congressional Committee

THE House of Representatives' committee on irrigation of arid lands favors the sale of surplus electric power on the Salt River reclamation project in Arizona on leases not to exceed fifty years in duration. The committee inserted a proviso in its bill that the charge for power may be readjusted at the end of five, ten or twenty-year periods after the beginning of any contract for its sale. The committee did not act on the recommendation of the Secretary of the Interior that the fifty-year leasing right be extended to all federal irrigation projects.

It is the desire of the Salt River Valley Water Users' Association to increase its plant so as to be able to deliver about three times more power than is being generated at present. Last year the output of the existing plant was 61,000,000 kw.-hr. With that output there was a profit of 5 per cent on the investment. The output can be tripled with a relatively small increase in the operating expenses and without the construction of additions to the transmission system. The Inspiration Copper Company and the Miami Copper Company are understood to be ready to finance the extension provided that they can make a fifty-year lease. The proposal has the indorsement of the Secretary of the Interior.

## A. E. S. Elects New Officers

AT THE successful spring meeting of the American Electrochemical Society held at Baltimore on April 27-29 these officers were elected for the ensuing year: President, C. G. Schluederberg, Westinghouse Electric & Manufacturing Company, Pittsburgh; vice-presidents, H. C. Parmelee, editor of *Chemical and Metallurgical Engineering*, New York; A. H. Hooker and W. S. Landis; managers, A. T. Hinckley, W. M. Corse and William Blum; treasurer, F. A. Lidbury, Niagara Falls; secretary, Colin G. Fink, New York.

Bradley Stoughton, New York, was elected chairman and John A. Mathews vice-chairman of the electrothermic division of the society. It was determined to hold the fall meeting at Montreal on Sept. 21-23.

# Current News and Notes

Timely items on electrical happenings throughout the world, together with brief notes of general interest

**University of Florida's Course for Metermen.**—Forty-eight men, including twenty-two representatives of electrical business throughout Georgia and Florida, twenty-two students and professors of the university and two salesmen, attended last month the first short course for electrical metermen at the University of Florida.

**"Selected Professional and Business Books."**—A list of 400 books on accountancy, industrial engineering and related business topics has, under the title quoted, been compiled by Scovell, Wellington & Company of Boston, with the object of indicating to engineers and business men some of the most useful among the thousands of such volumes now in existence. The compilation should be valuable in the selection of books for private or office business libraries.

**Seattle Municipal Lighting Plant Establishes Off-Peak Power Rate.**—The city of Seattle's municipal lighting plant is about to grant by city ordinance a reduction from the regular advertised power rates now prevailing of 25 per cent on off-peak power for all loads of 21 kw. or more. The peak-load hours are defined as the hours between 4:30 p.m. and 9:30 p.m. All power used during the peak period will be paid for at the present rates. The new rate is to be administered with the aid of graphic wattmeters. This legislation has come about largely as the result of the insistent demand of certain large users of power for a reduction in the rate for power used during the off-peak period.

**India's Big Hydro-Electric Power House.**—The largest hydro-electric power station in India, the Andhra Valley project, is nearing completion. The storage lake is about 60 miles from Bombay, and after passing through a tunnel 2 miles in length the water will be conveyed to the power house at the foot of the hills through six penstocks. Here six Pelton wheels will drive an equal number of generators, and the latter will deliver energy at 5,000 volts to step-up transformers, from which it will be transmitted at 100,000 volts. One unit, rated at 10,000 kva., will be placed in service probably in June and will relieve the demand for power in Bombay cotton mills. The whole of the plant, designed for an output of 60,000 kva., with room for additions, will be completed about twelve months hence. Incidentally, remarks the Bombay correspondent of the London *Engineer*, an interesting feature of this project is that energy will be delivered to consumers' doors at 20,000 volts and will be converted to 500 volts direct current on the spot.

**Automatic Hydro-Electric Plant in Vermont.**—Finishing touches are being put upon a new 5,000-kva. automatic hydro-electric plant for the New England Power Company at Searsburg, Vt., one of the largest of this type thus far designed for service in the East. The plant is on the Deerfield River, the plants along which are tied in with hydro-electric stations on the Connecticut River and with numerous steam plants. The Searsburg station delivers energy at 66,000 volts to the main transmission lines of the company near the Hoosac Tunnel, is designed to handle a maximum of 300 sec.-ft. under 210 ft. normal operating head, and has been planned for automatic starting and stopping by means of a time clock, the amount of load which is to be carried being predetermined and set at the governor mechanism. The mushroom-center differential surge tank, designed to prevent spilling of water in case

full load is thrown off the generator suddenly or the load instantaneously increased, is illustrated here.

**Railway Electrification Discussed at Ottawa.**—Electrification of steam railroads as an issue to be faced in the near future was brought up in the Canadian Parliament recently by the member for St. Mary's, Quebec, who dwelt on its relation to the fuel problem and to the destruction from forest fires. The speaker made the assertion that for an identical trip under the same load occupying the same time the cost of the motive power for an electric locomotive is as 88 to 200 compared with that for a steam locomotive and that the maintenance costs are as 8 to 18. He wished to know why the railroad built in the valley of the St. Maurice, where 800,000 hp. is available, should not be electrified. In view of his understanding that the Canadian Pacific Railway two years ago almost concluded a contract for the electrification of its line from Montreal to Quebec, he asked why the government lines in the neighborhood of Montreal had not been converted to electric operation. The Minister of Railways said that his department was keenly alive to the situation and would do its part as soon as financial conditions warranted a heavy capital expenditure.

# Associations and Societies

A complete Directory of Electrical Associations is printed in the first issue of each month

**Association of Municipal Electrical Utilities of Ontario.**—The summer convention of this association is scheduled to be held at Niagara Falls, Ontario, on June 22, 23 and 24.

**Field Day at Philadelphia.**—The "entire electrical industry of the city of Philadelphia and surrounding territory" is to have an outing at McCall Field on Saturday, June 3, under the auspices of the Electric Club of that city.

**American Society for Testing Materials.**—At the twenty-fifth annual meeting of this society, to be held at Atlantic City, N. J., on June 26-30, there will be reports from the committees on copper wire, coal, magnetic properties, magnetic analysis and electrical insulating materials. Papers of special interest to electrical men will be: "Electrical and Magnetic Weld Testing as Applied to Butt-Welded Steel Plates," by T. Spooner and I. F. Kinnard; "Forms of Specifications for Purchasing Coal," by Hubb Bell; "A Rational Basis for Coal Purchase Specifications," by E. B. Ricketts, and "The Problem of Durability Tests for Transformer Oils," by T. G. Delbridge.

### Coming Meetings of Electrical and Other Technical Societies

Electrical Supply Jobbers' Association—Hot Springs, Va., May 24-26.

A. I. E. E. Section Meetings—Atlanta, May 25; Utah, May 26; Vancouver, B. C., June 2.

N. E. L. A. Geographic Divisions—Pacific Coast, Los Angeles, May 31-June 3; Northwestern, Boise, June 7-10; North Central, St. Paul, June 13-15; Iowa Section, Lake Okoboji, June 20-22; New England, New London, Conn., Sept. 5-7.

American Association of Engineers—Salt Lake City, June 5-7.

Electric Power Club—Hot Springs, Va., June 5-7.

Canadian Electrical Association—Ottawa, Ont., June 15-17.

Associated Manufacturers of Electrical Supplies—Spring Lake Beach, N. J., June 19-25.

Society for the Promotion of Engineering Education—Urbana, Ill., June 20-23.

American Society of Civil Engineers—Portsmouth, N. H., June 21-22.

American Association for the Advancement of Science—Salt Lake City, June 22-24.

American Physical Society, Pacific Coast Section—Salt Lake City, June 22-24.

Association of Municipal Electrical Utilities of Ontario—Niagara Falls, Ont., June 22-24.

A. I. E. E. Annual Convention—Niagara Falls, Ontario, June 26-30. (For program see issue of May 13, page 968.)

American Society for Testing Materials—Atlantic City, N. J., June 26-July 1.

National Council of Lighting Fixture Manufacturers—Cleveland, June 28-29.

Ohio Electric Light Association—Cedar Point, Ohio, July 11-14. (For program see issue of May 13, page 972.)

A. I. E. E., Pacific Coast Convention—Vancouver, B. C.—Aug. 8-11.

International Association of Municipal Electricians—New Bedford, Mass. Aug. 22-25.

# Recent Court Decisions

Findings of higher courts in legal cases involving electric light, power and other public utility companies

**Taxpayer and Customer Not Allowed to Intervene in Suit Between City and Utility.**—The city of Grand Rapids, Mich., sued the Consumers' Power Company to enforce lower rates. On an ex parte order one Perry Schurtz was allowed to intervene as a taxpayer and a customer of the company using light in his office, home and garage. He claimed to be more interested in having service from the defendant than in the rates charged and asserted that the suit brought by the city, was "absolutely without foundation" and "should be dismissed." The Michigan Supreme Court held that he was without right to intervene in a suit by the city to enforce rates, either as a taxpayer or as a consumer, the interest of a consumer being held to be remote and conjectural. (185 N. W. 852.)*

**Value of Franchise Excluded in Fixing Rates—Federal Income Tax.**—In Georgia Railway & Power Company vs. Railroad Commission of Georgia, the United States Court for the North District of Georgia held that in a valuation for rate-fixing purposes the value of a franchise held by a public utility should not figure, as it is neither taken nor impaired, but its use required according to the original contract. Nor is failure to earn a fair return in past years a factor to be considered either by adding the deficiency to capital investment or amortizing it in future rates. The federal income tax, the court declared, reversing the commission, is not allowable as an expense of business. To permit law-controlled business to pass this tax to the customer, except as it may come to be reflected in generally higher returns obtained by invested capital, would be to subvert the policy of the law that imposes it, and, instead of placing these businesses on an equal footing with other investments of capital of similar security and permanency, would be to give them an advantage. (278 Fed. 242.)

**Instruction to Jury Concerning Danger from Electric Wires When Their Presence Was Not Shown Erroneous.**—In Duncan vs. Iowa Railroad & Light Company damages were awarded by the trial jury because of injury from steam sustained by a boy casually employed to clean a furnace in an electric power house. The Supreme Court of Iowa has reversed the judgment and remanded the case because of erroneous instructions by the trial judge, who in his charge set out the allegations of the petition concerning failure to furnish a safe place to work. These allegations referred to the presence of electric machinery and wires and of gas fumes, but no evidence was introduced of there being either electrical apparatus or fumes where the boy worked, and it was not alleged that be suffered injury except from steam. The fact that the boy was under sixteen years of age did not, the Supreme Court held, warrant an instruction that his employment in a dangerous task was illegal and negligence *per se* in the absence of an explicit instruction to the jury as to what constitutes such negligence. (187 N. W. 486.)

**Commission Upheld in Basing Valuation on Company's Books.**—The Supreme Court of New York, Appellate Division, has held, in People ex rel. Adirondack Power & Light Corporation vs. Public Service Commission, that the commission did not act arbitrarily in disregarding estimated reproduction cost new less depreciation, and in accepting the books of the corporation as much better proof of the capital actually expended and the present fair value of the property. Nothing, the court determined, should be allowed for the going value except to cover losses during the lean years while business was being developed and the corporation was not receiving a fair return. An allowance of working capital sufficient to pay expenses for one and a half months was not so small as to justify sending the case back to the commission. In allowing for continued high cost of materials and labor the corporation ought not to be required to run chances on the market nor ought consumers to be charged for a period of time at rates fixed on excessively high prices if such prices are transient. (193 N. Y. S. 186.)

**Los Angeles Contract with Central-Station Companies Sustained.**—In Los Angeles Gas & Electric Corporation vs. City of Los Angeles, a suit brought by the plaintiff as a taxpayer to enjoin the carrying out of a contract between the city of Los Angeles on the one part and the Southern California Edison Company and the Pacific Light & Power Corporation on the other for distribution of energy developed in city plants, the Supreme Court of California, sustaining the defendant, held that such a sale was not a "sale at wholesale of electric power," which would be contrary to the city's charter; that the contract was not invalid because city officials in executing it did certain things contrary to provisions of the charter and of the contract; that the sale and distribution of electrical energy manufactured by a city is a municipal affair and one over which the Legislature of the state has no control; that the contract was not a "lending of credit" within the constitutional prohibition; that "surplus power" could legally be sold by the city at wholesale, and that the contract did not come within a charter provision requiring letting to lowest bidder. (205 Pac. 125.)

*The left-hand numbers refer to the volume and the right-hand numbers to the page of the National Reporter System.

# Commission Rulings

Important decisions of various state bodies involving or affecting electric light and power utilities

**Schedules Effective Through Error.**—Increased rate schedules for electrical energy distributed by the St. Joseph Transmission Company which had been allowed to become effective because of an error made by the electrical department of the Missouri Public Service Commission were ordered by the commission to be stricken from the files, with leave to the company to refile the schedules with the necessary modifications.

**Service Charge Permitted in Massachusetts.**—A petition was filed with the Massachusetts Department of Public Utilities by the Worcester County Gas Company to place in effect a service charge of 50 cents per meter. It was found that the establishing of the proposed charge, under the rates assented to by the company, would not impose an additional burden on any consumer who uses during a month 1,000 cu.ft. of gas and would effect a reduction to those using in excess of that quantity. The commission was of opinion that the plan was worth a test and therefore permitted the charge.

**Merchandise and Jobbing Business and Central-Station Expenses.**—An electric company should not charge to operating expenses expenditures incurred in its merchandise and jobbing business, said the New Hampshire Public Service Commission in fixing rates for the Plymouth Electric Light Company, and the fact that the salaries of the treasurer and the manager of an electric company were very much in excess of what other electric utilities paid for similar services was accepted as evidence that their salaries should be apportioned between the utility business and the merchandise and jobbing department.

**Three Different Charges in Rural-Service Bill Forbidden.**—In adjusting the electric rates of the Apple River Milling Company the Wisconsin Railroad Commission said: "The rural rate suggested by the applicant in its petition provides for a connected load charge, a transformer service charge and an energy charge. This schedule necessitates three separate computations in determining the bill of each rural consumer. We can see in it no particular advantage over the plan of rate presented by the Wisconsin Electrical Association, which has been approved and placed in effect by the commission in the majority of cases involving rural rates. In order that the type of rural rate shall be generally uniform we shall order that the applicant apply this standard form to its rural consumers."

# Men of the Industry

Changes in Personnel—Responsibilities and Association Appointments of Men Engaged in Professional, Executive, Operating and Commercial Branches of the Industry

**Ralph Rainsford** has been appointed chief engineer of the Philadelphia Company, Pittsburgh, Pa. The requirements for this position are unusual because the company controls the Duquesne Light Company, the Equitable Gas Company and the Pittsburgh Railway Company, besides numerous subsidiaries connected with the controlling company's manifold interests. In Mr. Rainsford it is believed that the Philadelphia Company has obtained the services of an engineer who has the executive and business training necessary to fill the position successfully. Mr. Rainsford

RALPH RAINSFORD

was graduated from Harvard University in the class of 1902. After two years of construction work in the West he became connected with the Guggenheim interests, with which he was associated for four years. Later he represented a New York banking group with wide interests. For this group he was manager and engineer of properties in the West for six years, being then transferred, at the request of the bankers, to the General Motors Company, in which they were heavily interested. When the group he represented withdrew from its connection with the General Motors Company Mr. Rainsford joined the J. G. White organization as an engineer. He served in the war, having joined the first business men's regiment at Plattsburg in 1915 and 1916, and in 1917 was commissioned as a captain in the aviation section of the Signal Corps. After the war he resumed his connection with the J. G. White organization and was also for a time a consulting engineer, opening an office in New York City in this connection.

**Charles E. Cansfield**, formerly with the Toronto & Niagara Power Company, has opened an office in Toronto for the practice of electrical engineering.

**H. J. Pettengill, Jr.**, has been appointed sales manager of the gas and electric division of the Stone & Webster properties at Pawtucket and Woonsocket, R. I.

**Robert O. Sweezey**, a well-known consulting engineer on forestry, hydroelectric and pulp and paper problems, has become a member of the newly organized investment banking firm of Newman, Sweezey & Company, Montreal, Canada. Mr. Sweezey, although giving considerable time to the new financial concern, will continue the practice of his profession.

**Robert W. Adams**, Rhode Island manager for the General Electric Company, has been elected chairman of the Providence Section of the American Institute of Electrical Engineers. Mr. Adams is a past-president of the Providence Engineering Society and is widely known in central-station and industrial circles.

**Col. Samuel W. Fleming, Jr.**, of the firm of Gannett, Seelye & Fleming, engineers, Harrisburg, Pa., will sail on the Paris from New York May 24, with the Pennsylvania French and Belgian Battlefield Commission, of which he is a member. The commission will make a thorough study of the battlefields in France and Belgium where Pennsylvania troops were in action.

**Elbert G. Allen** has been appointed chief engineer of the Philadelphia Rapid Transit Company and will co-ordinate all of the engineering activities of the company. He was born in East Bridgewater, Mass., in 1879 and was graduated from the Massachusetts Institute of Technology in 1900 with the degree of S. B. in mechanical engineering. In 1901 he received the degree of S. M. for completion of the course of electrical engineering and for advanced work. In the same year he entered the employ of Stone & Webster, remaining with this concern continuously for twenty years, during which time he had exceptional opportunities for wide experience in both office and field work. In September, 1921, Mr. Allen entered the employ of the Mitten Management, Inc., of Philadelphia, and after spending several months on power work for the International Railway at Buffalo, he entered the Philadelphia office of the Mitten Management. In April of this year he took up his new duties with the Philadelphia Rapid Transit Company.

**Mitsuichi Oshhima**, hydraulic engineer of the Shinyetsu Electrical Power Company of Tokyo, Japan, is making a tour of the United States in the interest of his company. He is visiting every large power plant and machinery manufacturing concern for the purpose of seeking American ideas.

**Thomas J. Kelly**, superintendent of distribution of the Northern Indiana Gas & Electric Company, has been transferred from Fort Wayne, Ind., to Lafayette, Ind., where he will take up the duties of engineer of gas, electric and water operation. Mr. Kelly is a graduate of Purdue University. He has been with the Northern Indiana company since 1914. His place at Fort Wayne will be taken by J. P. Darrat of Janesville, Wis. Mr. Darrat has been in the distribution department of the Janesville Gas Company.

**Joseph G. Swallow**, superintendent of installation and inspection department of the United Electric Light & Power Company, was tendered a testimonial

J. G. SWALLOW

dinner at the New York Athletic Club by the staff council of the company on Wednesday evening, May 10. Frank W. Smith, vice-president and general manager of the company, outlined Mr. Swallow's thirty-one years of loyal service with the company, and appreciative remarks were also made by other executives and heads of departments.

**O. E. Wasser**, formerly auditor of the New York State Gas & Electric Corporation, has been elected secretary-treasurer of that company.

**Roy R. Burnham** has been elected chairman of the New England Section of the Illuminating Engineering Society. Mr. Burnham has been active in Boston consulting engineering circles for some years, having been identified with the electrical design and construction of the Victory destroyer plant at Squantum and the Boston army base, and later engaging in general electrical engineering practice, in which connection industrial illumination problems have occupied much of his attention. Mr. Burnham recently moved his offices to 119 Water Street, Boston.

**Nelson J. Darling,** who was recently appointed manager of the River Works of the General Electric Company at Lynn, Mass., succeeding the late Richard H. Rice, was born at Toronto, Can., in

N. J. DARLING

1884 and was graduated in 1907 from Cornell University with the degree of mechanical-electrical engineer. He entered the testing department of the General Electric Company at Schenectady soon afterward and remained there until the spring of 1909. For about six months he was engaged in electrical construction work on the Panama Canal under Messrs. Dodge & Day, returning for a few more months' service at Schenectady. Mr. Darling then was transferred to the gas-engine engineering department at the Schenectady and Erie (Pa.) works, and for about two years prior to the outbreak of the world war was attached to the company's gas-electric motor-car sales organization with headquarters at Erie. During the war he served successively as executive in charge of the manufacture of English and Russian high-explosive shells at Erie, engineer in foundry work and executive in charge of the manufacture of steam turbines for destroyers at Erie. In 1918 and 1919 he was production manager of the Erie works and then assistant manager. From Erie he was transferred to Lynn.

**S. B. Overton** is now connected with the sales organization of the Elliott Company in the Philadelphia office.

**W. E. Widau,** formerly of the Cleveland district office of the Elliott Company, manufacturer of power acessories, has been made assistant general sales manager for the company, with headquarters at Jeannette, Pa.

**M. C. Morrow,** who has recently been promoted to assistant to manager of the merchandising sales department of the Westinghouse Electric & Manufacturing Company, entered the employ of that company in 1900 as an office boy at East Pittsburgh. A year later he was transferred to the sales department, and in 1902 he went to the Philadelphia office as correspondent. Four years later he was promoted to the position of traveling salesman in the supply department, Philadelphia office. In 1912 he left the Westinghouse company, but returned three years later and was placed in charge of the promotion of electric heating apparatus sales campaigns throughout the United States. In 1913 he was promoted to the managership of the appliance section of the supply department and later was made assistant to the manager of the supply department. In 1920 he was made manager of the merchandising show in New York and also assistant to the sales manager of the Westinghouse Electric Products Company, holding this position until his present promotion.

**W. O. Renkin,** formerly engineer in charge of the pulverized-fuel department of the Quigley Furnace Specialties Company, is now managing engineer for that company's successor, the Quigley Fuel Systems, Inc., New York. Mr. Renkin has had considerable experience in this field, having made a special study of the application of pulverized fuel to industrial furnaces and boilers while with the A. M. Byers Company, Pittsburgh. Before becoming connected with that company he spent several years in British India in charge of pioneer construction for the Tata Iron & Steel Company works at Jamshadpore, Bengal. Mr. Renkin received his engineering education at Cornell University, finishing in 1895, and is a member of the American Society of Mechanical Engineers and also of the Engineers' Society of Western Pennsylvania.

**Harry W. Bliven** has been appointed vice-president of Harvey Hubbell, Inc., Bridgeport, Conn. For more than twenty years Mr. Bliven has been general sales manager of the company. As vice-president he will continue to have charge of sales. He was born and educated in Connecticut and gained

H. W. BLIVEN

his first electrical experience as salesman for the Western Electric Company. This position he held for eight years, resigning in 1904 to make his present connection.

**Harrison P. Reed,** for many years electrical engineer in and more recently head of the elevator department of the Cutler-Hammer Manufacturing Company, Milwaukee, has been appointed

H. P. REED

general manager of the A. Kieckhefer Elevator Company, Milwaukee. Mr. Reed is a graduate of the electrical engineering department of Cornell University, class of 1909, and has been a frequent contributor to engineering publications. He recently read a paper on "Electric Power Application to Passenger and Freight Elevators" before the American Institute of Electrical Engineers, of which he is a fellow. Mr. Reed has also been chairman of the Milwaukee Section of the A. I. E. E. He is a member of the Engineers' Society of Milwaukee. He assumed his new duties May 1.

**R. K. Williams** has been appointed a salesman in the Cleveland office of the Elliott Company.

**W. T. Bickel** has been added to the sales force of the Elliott Company with headquarters at the company's Pittsburgh office.

**J. R. Lemon** has joined the sales force of the Elliott Company, Jeannette, Pa., with headquarters at the Philadelphia office of the company.

**W. Ross Hilton** has been appointed representative of the Betts & Betts Corporation, New York, in Quebec, New Brunswick, Nova Scotia and Ontario territory. He will make his headquarters in Montreal.

## Obituary

**Charles C. Michael,** for twenty-six years superintendent of the Bristol & Plainville (Conn.) Electric Company, died recently at Edgewood, Conn. Mr. Michael was born at Red Wing, Minn., in 1868 and in his early life was active in field construction work, in power-plant developments and electric fountain displays.

# Trade and Market Conditions

**Business Reviews, Together with Market Letters from Important Trade Centers, on the Supply, Demand and Prevailing Prices of Electrical Apparatus and Supplies**

## Orders for Refractories Gaining, with Prices Firm

BOTH new business and production of fireclay brick have been gaining recently, according to the report of the Refractories Manufacturers' Association for March, the latest month on which figures have been published. New orders, expressed in percentage of the monthly economical producing capacity, amounted to approximately 55 per cent, while production totaled around 52 per cent. Other figures give shipments as about 48 per cent, stocks about 188 per cent and unfilled orders about 40 per cent.

Business, according to several manufacturers, is good as compared with last year, though the figures quoted above show it to be considerably below the normal average for the years immediately preceding 1921. It is reported that the iron and steel industry, though operating closer to capacity than at any time for the past twelve months, is still somewhat conservative in buying for future needs. The end of the coal strike should see this condition changed. Central-station companies are buying more generously, however. Prices are firm, and there are rumors of an advance, but buyers are evidently of the opinion that the market is not strong enough to permit this and are not making any effort to get under cover.

## Improved Trade in Electrical Porcelain

THERE has been noticeable improvement in recent weeks in the low-tension or dry-process electrical porcelain industry, particularly in the demand and distribution of standard items, regularly stocked and sold by the jobbing trade. These products enter directly into the construction of a building, and the marked increase in certain lines of the construction industry has had its effect on standard electrical porcelain commodities. The extent of this improvement is pointed out in a statement to the ELECTRICAL WORLD by a prominent manufacturer, setting forth that the aggregate value of standard porcelain shipped during the month of March, 1922, was 67.5 per cent of the total for the corresponding month a year ago, but as the price level is 55 per cent lower than that in the previous year, the increase in volume is approximately 50 per cent.

This manufacturer views the outlook as most favorable. As standard electrical porcelain products are being sold today, it is said, at less than the actual cost of manufacture, it is held that prices will stiffen materially just as soon as building operations have reached a sufficient point to intensify the demand.

In the special porcelain field, or the other branch of the dry-process porcelain industry covering built-up wiring devices and the like, improvement has not been noticed to the same extent. The informant of the ELECTRICAL WORLD points out that plants in this field are running at from 25 to 45 per cent of capacity, with signs of early increase.

With prices about 100 per cent above the level of 1915, the average buyer, it is set forth, finds it hard to understand why special electrical porcelain prices should not reach prewar figures, as have some other commodities. The reason is found in the fact that flint, feldspar and imported clays are now costing about 100 per cent more, and American clays and coal 150 per cent more, while labor, which is one-half the cost of production, ranges from 100 to 300 per cent higher than in 1915. As practically all of the cost of pottery materials is based on labor, fuel and transportation, it is easy to understand that further liquidation in these items, and primarily in wages, is necessary before any further reduction in the cost of production can be had.

The opinion of this manufacturer, shared by other leading electrical porcelain producers, is that a gradual but constant and healthy betterment in the situation can be expected.

## Radio Broadcasting Stations Increase 50 per Cent in Month

FIGURES showing the expansion of interest in radio telephony appear in a survey of the merchandising and advertising possibilities of the art prepared by the bureau of research and information of the National Retail Dry Goods Association. Broadcasting stations of the 360-meter length, according to these figures, number now well over 100, an increase of more than 50 per cent in less than one month. Department-store broadcasting stations of this class throughout the United States have increased 100 per cent within the one-month period and constitute nearly 13 per cent of the total number. There are listed in the report 202 manufacturers of radio apparatus, including thirty-four plants producing complete receiving sets, eighty-five manufacturers of accessories and special units for receiving sets, twenty-three manufacturers of raw materials and parts used in construction of radio apparatus, and thirty-four manufacturers of A and B batteries and battery-recharging devices.

## Metal Market Situation

COPPER is still holding firmly to its 13¼-cent level, and some producers have even gone so far as to ask 13¼ cents per pound for electrolytic, delivered. However, this means that they are more or less out of the market, for there is plenty of the metal on the market at the lower price. Domestic demand is still very good, and this, coupled with the decrease in the surplus stocks, may soon bring another advance. Domestic buying is quite evenly distributed. One large agency reports that virtually all of its regular consumers, both wire and brass, have bought on this present movement. Buying is still mainly for May and June, with July commitments increasing, but with little inquiry yet for August. Foreign buying is still good.

Following the unusual demand of a few weeks ago, the lead market has become more quiet. Consumers seem to feel that the upward movement has been halted and that they need not hurry to provide for future requirements. Lead is freely offered at 5.25 cents, New York.

### NEW YORK METAL MARKET PRICES

| Copper: | May 9, 1922 | May 16, 1922 |
|---|---|---|
| London, standard spot | £ s. d. 60 5 0 | £ s. d. 60 10 0 |
| | Cents per Pound | Cents per Pound |
| Prime Lake | 13.00 -13.25 | 13.25 |
| Electrolytic | 13.00 | 13.00-13.12½ |
| Casting | 12.62½ | 12.62½ |
| Wire base | 14.62 -14.87½ | 14.62½-14.87½ |
| Lead, Am. S. & R. price | 5.25 | 5.35 |
| Antimony | 5.37½-5.50 | 5.37½- 5.50 |
| Nickel, ingot | 36.00 | 36.00 |
| Sheet zinc, f.o.b. smelter | 7.50 | 7.50 |
| Zinc, spot | 5.40 | 5.50 |
| Tin, straits | 30.62½ | 30.75 |
| Aluminum, 98 to 99 per cent | 19.10 | 19.10 |
| **OLD METALS** | | |
| Heavy copper and wire | 11.00 -11.25 | 11.25 -11.37½ |
| Brass, heavy | 5.25 - 5.50 | 5.25 - 5.50 |
| Brass, light | 4.87½- 5.12½ | 4.87½- 5.12½ |
| Lead, heavy | 4.50 - 4.62½ | 4.50 - 4.62½ |
| Zinc, old scrap | 2.75 - 3.00 | 2.75 - 3.00 |

# THE WEEK
## IN TRADE

Prices When Quoted Are Those Prevailing at the Opening of Business on Monday of This Week for Points West of the Mississippi River and on Tuesday for All Eastern Points

IF NO sudden spurt in industrial activity is reported from any section of the nation, neither is there any setback in the gradual movement toward better times. The prevailing tone is one of encouragement and confidence. The busiest spot in the electrical field continues, of course, to be that which is filled by radio equipment, where supply is still vainly trying to get within hailing distance of demand. Chicago, however, reports a slight slump in orders for this apparatus, which is attributed to warm weather. The same increase of temperature has started fans moving in the Middle West. New York reports wiring supplies fairly brisk and the jobbers' outlook promising. Building operations maintain or surpass their previous good record all over the country. Woolen mills are active in New England, though the textile strike still hampers cotton manufacture. Agriculture promises splendidly in the Middle West, but has been retarded by bad weather in some parts of the Southeast. Better buying is, none the less, reported from Atlanta.

On the Pacific Coast an improvement in the employment situation is announced. In some parts of California rainfall has been subnormal, but in general crop reports are good. The business revival lags in the Intermountain States, but the gradual resumption of mining will help the return to prosperity, and fewer men are reported out of work.

### NEW YORK

The movement of wiring supplies continues at a fairly brisk rate, and the strong tone of trade in electrical circles indicates further improvement. Jobbers who predicted that business would open up this spring are beginning to realize on their optimism and do not look for any serious reaction during the summer and fall months. While hand-to-mouth buying has almost disappeared, purchases are being made on a conservative basis and dealers are inclined to build up stocks only gradually. There seems, however, to be no immediate need for increasing stocks as those in the hands of jobbers are in very fair condition and the manufacturers are making prompt shipments.

Building operations continue to increase rapidly in both the Metropolitan district and outlying sections. Jobbers are feeling the effect of this in the increased size and number of orders from their customers. Collections, if anything, show a slight improvement, but the average continues to be around sixty days. The advent of radio business has somewhat improved the average collections because of the increase in cash sales. On the other hand, with the greater number of new dealers, credit men have to be careful.

**Rigid Conduit.**—Demand is fairly active and most jobbers are quoting the new schedule of prices on pipe. Some small stocks which were bought at the old price are still in jobbers' hands, and small quantities can be purchased on that basis. On carload lots the new price is being quoted. Under the above conditions prices ranged as follows: For ½-in. black pipe in 2,500-ft. lots, $44.50 to $46.58; ¾-in., $58.10 to $59.57, and 1-in., $82.79 to $84.66 per 1 000 ft. Quotations on galvanized pipe in the same sizes and quantities were $50 to $51.68, $64.50 to $66.47 and $92.20 to $94.88 per 1,000 ft.

**Rubber-Covered Wire.**—Sales have been good with prices steady. Stocks in jobbers' hands are ample to meet the demands. Quotations on No. 14, rubber-covered, single-braid, in 5,000-ft. lots are from $6.15 to $6.25 per 1,000 ft.

**Flexible Armored Conductor.**—The volume of sales holds up well, and stocks in jobbers' hands are fair. No. 14, two-wire, single-strip, sells for $43 to $45 per 1,000 ft., and double-strip is quoted at $45 to $47 per 1,000 ft.

**Loom.**—There exists only a moderate demand for this material, and stocks are kept pretty low. The $\frac{7}{32}$-in. and ¼-in. sizes listing at $5.50 and $6 per 100 ft. are quoted at 70 and 10 per cent off list in 1,000-ft. lots.

**Fans.**—Sales have continued to hold up remarkably well considering the cool weather. Jobbers report that a considerable number of fans are being sold at this time for commercial uses, mostly new restaurants and small stores.

**Tape.**—Both friction and rubber tape are quoted at 36 cents a pound in quantities of 25 lb. and over.

**Radio.**—Dealers continue to clamor for wireless apparatus, and jobbers have booked orders considerably in advance of deliveries.

### CHICAGO

The electrical trade situation appears to have changed very little during the week. While the business momentum of the past month has been sustained, the upward trend has been slow and is visible only from a time prospective of several weeks. The building of the long-needed apartment houses and private residences is progressing at a favorable rate for electrical contractors. A slightly improved market is shown by the fact that the individual orders are increasing in size. All the wiring materials are maintaining their previous steady movement. Dealers in washing machines and vacuum cleaners are reporting better action and enthusiasm in these lines. The warm weather of the past week has started a healthy movement of fans. The radio demand has also felt this warm weather in the form of a slight slump, and prices are improving because of more frequent shipments.

**Wire.**—A steady demand for this material, with considerable price variation, was the chief important event of the week. The rubber-covered No. 14 is selling around $6 per 1,000 ft. in 5,000-ft. lots, and in a few cases better prices than this have been quoted. The building activity is still continuing its upward limit, and jobbers report that this is the reason for the improved market.

**Conduit.**—Action on conduit is also going well and, according to most jobbers, in lots of increased size. The ½-in. black pipe sells for $43 per 1,000 ft. in 5,000-ft. lots and stocks are good.

**Flexible Armored Conductor.**—The movement on armored conductor has followed along the increase in building so that most jobbers are selling larger-sized lots than formerly. The No. 14 two-wire, single-strip, is quoted in 5,000-ft. lots from $42 to $44 per 1,000 ft. Stocks fair.

**High-Tension Equipment.**—Orders have been received by one manufacturer for outdoor substations with ratings of 600 kva. and 900 kva. at 22,000 volts, 450 kva. at 45,000 volts and 5,000 kva. at 66,000 volts. Another concern reports that inquiries are improving and that fifty busbar supports were shipped to a utility in New York State.

**Washers and Cleaners.**—While marketing efforts are still strong, the value of this work is indicated by the improved sales on washing machines and vacuum cleaners. Dealers say that market is improving encouragingly.

**Lamp Cord.**—The call for lamp cord has fallen off along with the demand for portable lamps. The No. 18 twisted cotton, $\frac{3}{64}$-in., is quoted at $15 per 1,000 ft., while the same size with silk covering sells for $25.50 per 1,000 ft.

**Lighting Fixtures.**—Dealers report an improved market for house-lighting fixtures because of the active increase in residential building. Stocks are good. The call for industrial fixtures is also improving.

**Radio.**—A slight slump in the demand for this equipment, together with better shipments from manufacturers, has improved prices. Head telephones are better distributed, but vacuum tubes are still behind on orders.

## BOSTON

Activity in both wholesale and retail circles is well sustained. The underlying gradual improvement in New England business continues, with some irregularities. Building operations still gain in striking fashion. Contracts awarded in New England for the week ended May 9, 1922, totaled $10,079,700, compared with $5,230,100 for the same week last year. This record is far ahead of any similar week in twenty years with the exception of 1920, which slightly exceeded the above figure. Trade in staple electrical appliances is moving along nicely, on the whole. Wiring devices are a little quiet this week and prices are holding fairly firm with the exception of materials changing hands under acute competition. Miniature-lamp schedules are now distributed on a lower price basis as of May 1. In the textile field woolen mills are active, while cotton mills are hampered in some localities by the long-continued strike. Better labor conditions are noted in the leather industry and paper mills are busy. Metal-working establishments are doing better. Nothing seems able to affect the tremendous demand for radio apparatus.

**Safety Switches.**—Business is looking better, and one New England producer reports a fifteen-thousand-dollar order in progress, with growing interest in this type of equipment. Sales are being made largely on a quality basis, price being less important in the eyes of the purchaser.

**Lamps.**—List prices on certain miniature tungsten lamps have been reduced from 10 to 25 per cent, depending on the lamp number. The demand for lamps in general holds up well, and motion-picture lamps are moving with some spirit. Portables are doing better than might be expected at this season, and the consumption of the "bread-and-butter" types continues excellent.

**Radio Equipment.**—Vacuum tubes are scarce and the shortage of telephone receivers shows little improvement. Wire for aërials is now more plentiful. A leading jobber's price on No. 14 seven-strand, tin-clad bare copper is 75 cents per 100 ft. in 100-ft. lots and on No. 14 copper-clad steel wire in the same quantity 50 cents per 100 ft.

**"Nail-it" Knobs.**—Stocks are easily meeting current demand, and prices are quiet, with a normal quotation of $15.50 per 1,000 in barrel lots.

**Wire.**—Rubber-covered wire is less active for the moment, and on Saturday one large jobber had nearly 500,000 ft. of No. 14 in stock. In 1,000-ft. lots this size and type is moving around $6.25 per 1,000 ft. Weatherproof wire is moving quietly around 17 cents base in small quantities to 15½ cents in larger amounts. Transmission-line construction contemplated soon in central New England will quicken the movement of bare copper wire and insulators, if arrangements now pending go through along lines desired by one of the larger hydro-electric utilities.

**Flexible Armored Conductor.**—Recent activity in this material is well sustained, and No. 14 single-strip is moving around $42 net per 1,000 ft. in 1,000-ft. lots.

**Potheads.**—Prices have been reduced on some designs. One house is offering a three-conductor pothead formerly selling at $27 net at $22.50 with a sealed top bushing and at $21 net in the side-screw type bushing.

## ATLANTA

The business outlook continues to brighten with the advent of real spring weather, the week just past being the first seasonable week for some time. The inclement weather has given a slight setback to farming operations. Crops in general are late, and the planting of cotton in the northern part of Georgia is very light. The southern part of the state, however, is in fine shape agriculturally. The citrus crop in Florida has shown improvement and conditions as a whole are reported good. Eastern markets are absorbing all the fruit produced at increased prices, and this is reflected in the very optimistic feeling throughout the citrus section.

Retail merchants as a whole report conditions improved, with an increased tendency on the part of the public to buy a little more liberally, and collections show a slow but steady improvement. A number of state banks which failed last year in the smaller towns are being reopened and are assisting materially in bettering business conditions.

Building in the twenty-three largest towns in the Southeast for the month of March shows a total of 3,223 permits with a valuation of $6,850,452, an increase of $2,212,725 over the same period of 1921. Only six of the towns in question show a decrease, these being Mobile, Pensacola, Tampa, Augusta, Meridian and Chattanooga. As a result of this condition the general market for electrical building supplies is showing a satisfactory activity and jobbers report that they are swamped with orders for radio equipment.

**Farm-Lighting Outfits.**—Sales of this specialty have slowed down somewhat in the past few weeks, owing probably not to a lack of interest but to the fact that money is required for financing agricultural operations. Stocks are in good condition with shipments satisfactory. No recent price changes are reported.

**Safety Switches.**—This line continues active, particularly in the more popular sizes of from 30 amp. to 200 amp. in both the two-pole and three-pole types. All jobbers report satisfactory stocks with prices steady.

**Oil Switches.**—A slight increase in the movement of this line is reported, due in all probability to the increased activity in the industrial plants in the section. Sales activities by the larger companies will create an even brisker market in the future. Local stocks are fair to good.

**Insulators.**—Glass telephone insulators continue in fair demand, but the porcelain types are somewhat slow, except in the larger centers where the central-station companies are pushing line extension work. Stocks of both varieties are ample.

**Schedule Material.**—This line is quite active, the heavy building program throughout the section having caused a very brisk demand for all classes of wiring specialties, particularly sockets and snap switches. Jobbers have plentiful stocks on hand with no prospects of immediate price changes.

**Battery-Charging Outfits.**—Little movement in this line is as yet apparent, though increased activity in the automobile business is sure to stimulate the sales of this specialty in the near future. Jobbers' stocks are reported good to heavy.

**Ranges.**—High prices continue to hold down the volume of sales in this line, though some increase is to be noted, resulting from campaigns by various dealers. Jobbers' stocks are in good shape.

## ST. LOUIS

The week closed with comparative dullness in the electrical jobbing field, but on the whole business was good. The prospects in future business continue to grow more promising. The agricultural conditions indicate a bounteous yield this year, commercial activity is increasing, and virtually every line of manufacture shows improvement. Construction work, especially of residences, is expanding rapidly throughout the entire territory. Industrial plants in many instances are taking advantage of the present low prices on wire, conduit and motors to make improvements which have been deferred for months. The central-station companies are making preparations for substantial increases in their loads.

The effect of these conditions is noted in the increased sales of electric goods of virtually all kinds. In radio equipment the demand is, of course, feverish. Power generating equipment, substations, transformers, meters, wire, conduit, etc., are moving in entirely satisfactory volume. Warm weather is being experienced, and with it the fan business has opened. A warm spring such as this usually results in a good fan season. Stocks everywhere are in good condition and inventories have been liquidated.

**Wire.**—Prices are firm, with stocks amply large to meet the increasing demand. Representative prices on rubber-covered per 1,000 ft., in 5,000-ft. lots, are as follows: No.

14, $6.25; No. 12, $8.50; No. 10, $11.25; No. 8, $15.05. The base price on bare is 17 cents per pound, and the base on weatherproof is 15.5 cents to 16 cents per pound. The power companies are in the market for sizable quantities of weatherproof.

**Porcelain.**—The demand is steady, with some indication of improvement, and stocks have been reduced to a conservative basis. "Nail-it" knobs are being generally sold at $15 per 1,000 in barrel lots, and likewise 5½-in. split knobs are sold at $10.70 per 1,000 in barrel lots. The prices per 1,000 of other items are: Two-wire or three-wire unglazed cleats, $10.70; ⅞-in. x 2½-in. porcelain tubes, $3.75; ⅞-in. x 3-in. tubes, $4.50.

**Dry Cells.**—A strong demand continues, and the four-cell battery is growing in favor. Stocks are excellent, and prices are: Regular, $32.50 per 100 in lots of 100 and $31 per 100 in barrel lots; igniter, $33.50 per 100 in lots of 100 and $32 per 100 in barrel lots; four-cell, $1.70 each in lots of 24.

**Fuses.**—The demand shows improvement as the industrial plants increase their operations and, in the case of plug fuses, as new buildings are completed. Non-renewable cartridge fuses, 250-volt, in standard-package lots, are priced as follows: 0-amp. to 30-amp., $4.60 per 100; 35-amp to 60-amp., $6.90 per 100; 65-amp. to 100-amp., $20.70 per 100; 110-amp. to 200-amp., $46 per 100; 225-amp. to 400-amp., $82.80 per 100; 450-amp. to 600-amp., $126.50. Renewable fuses, 0-amp. to 30-amp., 250 volts, are quoted at $29 per 100 in standard packages, and the 31-amp. to 60-amp. fuses at $58 per 100. In the clear-window plug fuses prices range from $2.75 per 100 to $3.65 per 100 in lots of 1,000.

**Weatherproof Sockets.**—Except for some demand from the packing houses, the call is extremely light. Stocks are correspondingly low. Representative prices are found to be: Mica, $11 per 100; composition, $12 per 100; porcelain, $9 per 100.

**Radio.**—Back orders continue to pile up, notwithstanding the mass of low-priced equipment being sold by department stores and the ten-cent stores.

## PORTLAND—SEATTLE

Construction of state highways is now in full swing. Reports from employment agencies show that men who are really seeking work can now find jobs. Few are idle. Farm labor is in good demand, with wages tending upward. Lumber production for the week ended May 6 was 2 per cent above normal, the highest it has been in over two years. New business for the same week was 13 per cent above production, with shipments practically equaling production. Building continues very active. The cities of Seattle and Tacoma have entered into a mutual agreement for the interchange of power. Power will be exchanged over a tie line having a capacity of 15,000 kw. The line will be about 40 miles long and will cost approximately $150,000.

Among electrical jobbers business continues on the up grade and is generally quite satisfactory. Prices on the whole are quite stable, although there was a 7 per cent advance in the price of conduit in Portland in the past week. The Portland Railway, Light & Power Company has recently placed an order for a large amount of copper in connection with a line to its new Oak Grove project.

**Rubber-Covered Wire.**—There is a good demand for this material, with the size of orders increasing. Stocks are ample. No. 14 is quoted at from $6.48 to $6.70 per 1,000 ft. in 5,000-ft. lots. No. 12 in similar quantities is quoted at $9.10.

**Weatherproof Wire.**—Sales of weatherproof wire are picking up with the coming of good weather, prices are steady. No. 6 triple-braid is quoted at from $20.50 to $21 per 100 lb. in coil lots.

**Lamp Cord.**—Lamp cord is in good demand. No. 18 twisted cotton is quoted at $13.30 per 1,000 ft. in coil lots.

**Sockets.**—The movement in sockets is particularly good. Heavy stocks are carried which easily meet the demand. The following approximate prices are maintained per 100 for standard carton lots: Pull, $25; key, $24.75; keyless, $22.50.

## SAN FRANCISCO

The large increase in building in which all leading California cities are participating is very encouraging and has done a great deal to silence those who have predicted depressing conditions. At the same time a very slow collection rate is noted, affecting not only dealers but their customers also, and severe checking has been found necessary by the retailers. Light rains have been beneficial as the soil has been reported hard. Some of the richest districts, such as the central San Joaquin valley and the lower Sacramento valley, have had a subnormal rainfall, but in general the crops will be fair to good. These ripening crops are reflected in better orders.

**Pole-Line Hardware.**—Several excellent stocks are now carried on the Coast, and the recent settlement of boat service from the East has cut freight charges. As an example of local costs the following figures, which are pretty generally quoted for 1,000-piece orders of galvanized material, with from 5 to 10 per cent additional charge for 100-piece assorted lots, are interesting: Double-arm bolts, ⅝-in. x 18-in., $17.50 per 100; machine bolts, ⅝-in. x 18-in., $12.50 per 100; carriage bolts, ⅝-in. x 4-in., $1.75 per 100; lag screws, ½-in. x 4-in., $2.35 per 100; square washers, 2¼-in., $17.50 per 1,000; round washers, 1-in., $2.50 per 1,000.

**Household Material.**—It is very evident that radio interest has reacted upon the purchases of the larger household appliances. This is also evidenced by the larger commissions paid the outside crews for door-to-door soliciting. The figures for vacuum sweepers, for instance, have crept up in some cases from 15 per cent to a new mark of 25 per cent. Dealers are so much interested in the radio inquiries, for which just now very little sales effort is required, that they are prone to neglect household appliances, with the result that it is difficult to get a purchase order unless some guarantee method of selling goes along with the purchase. However, this field of sale is being clarified, and before the end of the year experts believe that a standardized selling method will have evolved out of present disorganization.

**Small Motors.**—Considerable missionary work is being done by manufacturers of such small household service motors as cream whippers, mayonnaise mixers and the like. There is a big field for their sale, but the buying public is unaware of their advantage. Good local stocks are carried, but so far most dealers feel that the present returns are not worth the increased sales effort.

## SALT LAKE CITY—DENVER

Business recovery throughout the Intermountain country continues at a slow but perceptible rate. The revival here lags, according to salesmen who make all the large jobbing centers. With the gradual resumption of mining, however, the strides toward normal conditions will be decidedly more marked. Collections show improvement from month to month and credit is easier. As the demand for building materials increases prices show a stiffening tendency. Sporadic labor troubles are reported from the coal fields, with production proceeding at a good rate in the non-union mines. The employment situation is much improved, with the prospect of a job for every idle man by the first of June. The carrying out of the Moffat railway project, to connect Salt Lake City and Denver by a shorter route, is now definitely assured. The Colorado Legislature has appropriated $6,000,000 toward its construction. Road improvements to the extent of $3,000,000 have been approved for Idaho.

Radio continues to hold the spotlight of interest. Jobbers are swamped with orders, with no assurance of immediate relief in the way of ample stocks.

**Wiring Supplies.**—Business is picking up as building activities get under way. Cottage building has brought back better times to contractor-dealers. Stocks are ample to meet requirements.

# Manufacturers' Activities

**Devoted to the Business Side of Manufacturing, Distribution and Sales, News from Jobbers and Foreign Fields and a Record of New Devices and Trade Literature**

## Allis-Chalmers Billings at Yearly Rate of $18,600,000

The Allis-Chalmers Manufacturing Company, Milwaukee, for the first quarter of the current year reports sales billed totaling $4,671,602, while net profits for the quarter, after providing for federal taxes, amounted to $278,733. Sales billed in the first quarter last year amounted to $7,656,218. Unfilled orders on hand at the close of the first quarter of 1922 were $8,011,463, as compared with $12,943,633 on March 31, 1921. Unfilled orders, however, show an increase over those on hand Dec. 31, 1921, which were $7,300,574. Bookings are said to be running in excess of billing and to be increasing steadily. March bookings were well over $2,000,000, while January bookings were considerably below $1,500,000. Good orders are being received for cement machinery, principally for road building.

## Credit Now Needs Broad Vision and Exceptional Judgment

One whose province it is to deal with foreign credit should bring vision and understanding to his work, not permitting himself to be bound by a too narrowly restricted consideration of the problem before him, declared L. R. Browne, credit manager of the International Western Electric Company, who addressed the ninth foreign trade convention at Philadelphia last week. "The aim of the credit manager," said Mr. Browne, "should be to build a foundation for future business that will endure. He should be actuated by larger motives than a desire invariably and above all things to play safe, no matter what may befall."

Mr. Browne went on to describe in detail the ideal credit manager, picturing him as one knowing as much about other countries and the lives and habits of other people as he does concerning those of the country in which he lives and whose language he speaks.

Charles M. Muchnic, vice-president of the Locomotive Sales Corporation, explained why our export trade is decreasing, giving as a main reason lack of foreign purchasing power. Lower transportation cost was the subject of a talk by W. H. Stevenson, president of the Lake Erie & Ohio River Canal Board of Pennsylvania. James S. Martin, publicity manager of the foreign department of the Remington Typewriter Company, asserted that the reduction of selling cost was the paramount problem of business.

F. de St. Phalle, vice-president of the Baldwin Locomotive Works in charge of foreign sales, told the delegates that while South Americans do trade with Germany they have experienced many disappointments arising from late deliveries, inferior material and, recently, invoice increases of accepted prices. He declared that the future holds out bright prospects for trade between South America and the United States. South America is expected to develop at an increasing rate because it is the most attractive and richest of the accessible thinly populated districts of the world. A larger proportion of this development must be financed and carried out with the assistance of the United States. With the general recovery of trade, Mr. de St. Phalle said, South American rates of exchange may be expected to rise. Some have already done so materially.

Stanley G. Flagg, Jr., an exporter of Philadelphia, said that the larger exporters who have been operating abroad for years are not curtailing their efforts to promote business, because they have experience behind them which leads them to believe that renewed and continuous efforts will in the long run produce business and repay their efforts.

## Stockholders Suggest Plan for Habirshaw Reorganization

Stockholders of the Habirshaw Electric Cable Company have suggested a plan of reorganization for that company calling for an assessment on common and preferred stockholders. The plan is being carefully considered by the creditors' committee. It calls for an assessment of $2 a share on the common and $25 a share on preferred stockholders. They would receive in return one share either of common or of preferred stock for each share turned in; also the equivalent of the assessed amount in a second-mortgage bond to run probably twenty years.

The Habirshaw Electric Cable Company has outstanding $2,000,000 consolidated 7 per cent bonds, due March 1, 1935; 132,945 shares of no-par common, and 9,630 shares of 8 per cent cumulative preferred stock, par $100. It has 3,000 shares of a subsidiary pledged with the government for advances. A first mortgage bond, covering this obligation, may be tendered the government if the plan meets with the approval of the creditors' committee. No decision is expected until after the middle of May. Owing to expansion in building construction, the company has considerable business on its books, but at low prices.

## General Electric Is Recalling Employees at Fort Wayne

"From the present outlook we will recall at least 200 employees in the next ten days or two weeks," said W. F. Melching, in charge of employment at the Fort Wayne (Ind.) plant of the General Electric Company. "We are much in need of machine operators. Efforts are being made to get in touch with our old employees who are able to do this work. A real shortage of female help exists at our plant."

It is officially stated that the transformer department has greatly increased its production during the past few weeks, and the taking on of more men has proceeded at an almost constantly increasing rate. The small-motor section of the plant also is experiencing a great increase in orders.

"Of course," said Mr. Melching, "we cannot foresee everything that may come up, but we are reasonably sure that this increase in business is permanent."

## Radio Manufacturer Incorporates and Expands Production

A million-dollar corporation has just been organized in Salt Lake City and a factory site purchased at Holliday, a suburb of that city, for the manufacture on a large scale of the Baldwin radio receiving sets. Many prominent business men of Utah, it is said, are interested in the corporation, which will be headed by David A. Smith, Lester D. Freed and Joseph F. Nibley.

For several years Nathaniel Baldwin has manufactured at 3474 South Twenty-third East Street, Salt Lake City, the Baldwin mica-diaphragm telephones. With the development of the radio telephone and the sudden spread of demand there developed a call for the Baldwin receivers which Mr. Baldwin has been unable to meet, owing to limited capacity. The capacity of the new plant will be between 1,000 and 3,000 receivers per day.

Mr. Baldwin holds the basic patents not only to the instrument but to the machinery which he has created for its manufacture. The present plans of the new corporation include the immediate construction of the first unit of its manufacturing plant, which is expected to develop into one of the largest industries in the West. All the stock in the new corporation has been subscribed for by Utah people.

## Illinois Testing Laboratories Increase Facilities

In order to obtain more manufacturing space for electrical instruments and pyrometers, the Illinois Testing Laboratories, Chicago, have moved from 340 South Green Street to 141-143 Austin Avenue. The new location affords the laboratories a floor space double the size of their old quarters. J. A. Osermaier, the chief engineer, speaking with a representative of the ELECTRICAL WORLD, said that more testing equipment had been added to maintain better testing service.

# Record of Electrical Patents

Notes on United States Patents

(Issued April 25, 1922)

1,413,678. ELECTRIC FURNACE; Frederick W. Moffat, Weston, Ontario, Canada. App. filed March 9, 1921. Resistance type, for use as enamelling oven.

1,413,685. POLYPHASE CHOKING COILS FOR RECTIFIER; Béla B. Schäfer, Baden, Switzerland. App. filed July 14, 1920. Coils for each phase on same iron core.

1,413,708. SIGNALING CIRCUITS FOR TOLL LINES; John Davidson, Jr., Montclair, N. J. App. filed Dec. 12, 1918. By using intermittently operating distributor for sending code signals.

1,413,725. WRAPPING MACHINE; Martin B. Grout, Chicago, Ill. App. filed Nov. 15, 1920. Applying reinforcing wrapping to object spirally.

1,413,732. ELECTRIC DISCHARGE APPARATUS; Raymond A. Heising, East Orange, N. J. App. filed Oct. 2, 1916. Aëroplane wireless set.

1,413,747. MEANS FOR STARTING AND OPERATING MOTOR GENERATORS; John C. Lincoln, Cleveland, Ohio. App. filed May 29, 1917. All windings connected in series while starting.

1,413,748. SIGNALING APPARATUS; Dimmitt R. Lovejoy, Freneau, N. J. App. filed June 26, 1918. Of the non-interfering successive type.

1,413,753. RECEIVING DEVICE FOR SIGNALING SYSTEMS; William H. Martin, New York, N. Y. App. filed Jan. 17, 1920. Vacuum-tube amplifier on ocean cables.

1,413,776. TIRE-WRAPPING MACHINE; George W. Prouty, Milton, Mass. App. filed May 27, 1920. For spiral wrapping of tires.

1,413,782. TELEPHONE SYSTEM; Alexander C. Reid, Genoa, Ill. App. filed Oct. 31, 1918. Vibratory rectifier for constant charging of supply batteries.

1,413,785. ARTIFICIAL CORUNDUM AND PROCESS OF MAKING SAME; Harold A. Richmond and Robert MacDonald, Jr., Niagara Falls, N. Y. App. filed Jan 7, 1921.

1,413,817. MERCURY MOTOR METER; Otis White, Springfield, Ill. App. filed July 5, 1921. Constructed to prevent spilling of the mercury.

1,413,887. INCUBATOR; Franz Baba, Irvington, N. J. App. filed May 13, 1919. Automatic temperature control.

1,413,932. FURNACE; Paul L. Pfanenschmidt, Dewsbury, England. App. filed Jan. 2, 1915. Produces articles made from quartz, silica sand or crystals.

1,413,939. RESISTANCE UNIT FOR ELECTRIC HEATERS AND REGULATING RESISTANCES; Willy Schulz, Frankfort-on-the-Main, Germany. App. filed June 17, 1916. Constructed in shapes to prevent short circuits.

1,414,007. PRESSING ELEMENT; William H. Berwick, Syracuse, N. Y. App. filed April 7, 1920. Iron with fluid chamber heated by electric element.

1,414,018. TELEMOTOR; Albert H. Heyroth, Duluth, Minn. App. filed Feb. 25, 1921. Electric time-switch circuit system.

1,414,059. METHOD AND APPARATUS FOR PRODUCING ALKALINE HYPOCHLORITES; LaFayette D. Vorce, Windsor, Ontario, Canada. App. filed May 28, 1920. Electrolyte cell for producing caustic and chlorine.

1,414,079. APPARATUS FOR DEHYDRATING OIL; Samuel A. Giebner, Bakersfield, Cal. App. filed May 12, 1919. By discharge of heavy current in emulsions.

1,414,105. TELEPHONE RECEIVER; John S. Timmons, New York, N. Y. App. filed July 17, 1918. Ring-shaped permanent magnet.

1,414,127. HANGER; Byron L. Heater, Forest Park, Ill. App. filed Aug. 30, 1920. Clamps trolley wire securely.

1,414,170. MAGNETIC SEPARATING PROCESS AND APPARATUS; J. P. Bethke and R. H. Stearns, Milwaukee, Wis. App. filed June 11, 1919. Uses alternating current to separate magnetic and non-magnetic materials.

1,414,179. CABLE SYSTEM; Louis Cohen, Washington, D. C. App. filed Dec. 28, 1918. Balancing in duplex-bridge cable signaling.

1,414,226. ELECTRIC HEATING APPARATUS; Wijtse B. Smits, Dilmen, Netherlands. App. filed March 1, 1920.

1,414,232. METHOD OF RECEIVING RADIO SIGNALS WITH THE COMPOUND HETERODYNE; Albert H. Taylor, Grand Forks, N. D. App. filed Aug. 12, 1919. For high-power work.

1,414,248. VOLTAGE REGULATION; James C. Armor, Pittsburgh, Pa. App. filed May 26, 1920. Maintains constant voltage on one of two circuits connected together.

1,414,259. PURIFICATION OF TIN; Jerome J. Collins, Southport, England. App. filed April 6, 1921. By dehydrating, fusing and electrolyzing stannous chloride.

1,414,274. TROLLEY GUARD; Rephael E. Harlowe, Los Angeles, Cal. App. filed Nov. 11, 1920. Arrangement to prevent dislodgment.

1,414,298. INDICATOR; Juan C. Montero, Washington, D. C. App. filed Sept. 18, 1918. Float-type electric indicator for gasoline tanks.

1,414,301. TROLLEY HARP; Charles W. Oldenquist, West Lynn, Mass. App. filed Sept. 29, 1919. Spindle for turning movement.

(Issued May 2, 1922)

1,414,362. ELECTRIC FURNACE; Arthur Jones, Belleville, Ill. App. filed May 13, 1920. Rotates electrodes.

1,414,369. STATION INDICATOR; Samuel Mitchell, Detroit, Mich. App. filed June 30, 1920. Automatic street indicator for trolley cars.

# Construction News

Projects, Plans, Bids and Contracts, Contemplated or Under Way

## New England States

CONCORD, N. H.—The Utilities Power Company, recently organized, will build a hydro-electric power plant on the Pemigwaset River, to cost about $1,000,000.

BOSTON, MASS.—A power plant, refrigerating plant, electric pumping station, etc., will be installed in the twelve-story building to be erected at Federal and Congress Streets by the Chamber of Commerce Realty Trust, 177 Milk Street, to cost about $5,000,000. Parker, Thomas & Rice, 110 State Street, are architects.

WATERTOWN, MASS. — The Edison Electric Illuminating Company, Boston, has acquired property on Spring Street for proposed plant extensions.

THOMPSONVILLE, CONN.—The Northern Connecticut Light & Power Company has filed notice of increase in capital stock from $700,000 to $1,000,000.

## Middle Atlantic States

BUFFALO, N. Y.—The Larkin Company, 663 Seneca Street, is preparing plans for a new power house at its soap factory. Griggs & Myers, 347 Fifth Avenue, New York, are engineers.

BUFFALO, N. Y.—The Council has approved of a three-year lighting contract with the Buffalo General Electric Company, all gas lights to be replaced with electric lamps during this period.

BUFFALO, N. Y.—The Buffalo General Electric Company will soon call for bids for a two-story service building at Niagara Street and Front Avenue, 115 ft. x 120 ft. and 151 ft. x 165 ft. Plans are being prepared for the construction of a new outdoor switching station at Tonawanda.

NEW YORK, N. Y.—S. B. Wight, agent for the New York Central Railroad Company and affiliated companies, will take bids until May 24 for incandescent lamps for the railroads for a period of one year from June 1, 1922, aggregating $300,000.

OLEAN, N. Y.—The installation of a municipal electric light plant is under consideration by the City Council.

WARSAW, N. Y.—Plans have been completed by the Warsaw Gas & Electric Company for the erection of a one-story power plant, 80 ft. x 105 ft.

ATLANTIC CITY, N. J.—The Atlantic City Electric Company has been granted permission by the Board of Public Utilities to issue $300,000 in capital stock, part of the proceeds to be used for extensions and improvements.

ALLENTOWN, PA.—The Lehigh Navigation Electric Company has issued $3,000,000 in bonds, part of the proceeds to be used for extensions and improvements.

KEATING, PA. — The Keystone Power Corporation, Ridgway, has acquired property at Keating for a hydro-electric plant.

LEBANON, PA. — The Lower Milford-Lehigh Power Company is being organized to install and operate a power plant in Lower Milford Township. S. P. Light represents the company.

McCONNELLSBURG, PA.—The lighting committee is raising a fund of $30,000 for the installation of an electric lighting system.

PITTSBURGH, PA.—The Board of Public Works will install a new lighting system on East Ohio Street, Northside.

PITTSBURGH, PA. — The Duquesne Light Company has applied to the Public Service Commission for permission to erect a transmission line in Plum Township.

POTTSTOWN, PA.—The Reading Transit & Light Company has been ordered by the Public Service Commission to make extensions and improvements to its system in this section.

READING, PA.—The Metropolitan Edison Company has issued $1,805,830 in capital stock, part of the proceeds to be used for extensions and improvements.

WILMINGTON, DEL.—The Street and Sewer Department will install ornamental lamps on King Street, between Front and Tenth Streets, replacing all arc and gas lamps.

BALTIMORE, MD.—Electrical and mechanical equipment will be installed in the grain elevator addition of the Pennsylvania Railroad Company at Canton, near Baltimore, to cost about $750,000.

BALTIMORE, MD. — The Susquehanna Water Power Company has been granted permission by the Public Service Commission to issue about $700,000 in capital stock, the proceeds to be used in connection with preliminary work for a hydro-electric plant on the Susquehanna River, near McCall's Ferry. The ultimate cost is estimated at about $15,000,000. Luther M. R. Willis, 213 Courtland Building, represents the company.

BALTIMORE, MD.—The Board of Estimates is arranging appropriations of $50,000 for the installation of improved electric lighting equipment in the public schools, as well as $169,000 for new power equipment.

BALTIMORE, MD. — The Consolidated Gas, Electric Light & Power Company will build a new substation at 700-704 West Pratt Street.

CHARLESTON, W. VA.—The West Virginia Water & Electric Company has issued $3,300,000 in bonds, part of the proceeds to be used for extensions and improvements. A. C. Babson is vice-president and general manager.

CLARKSBURG, W. VA. — The Council contemplates the installation of a fire-alarm and police-signal system, to cost about $88,000.

HUNTINGTON, W. VA.—The Union Gas & Electric Company, Cincinnati, contemplates the construction of an electric plant for mining service in this vicinity to cost about $1,500,000, including transmission system. W. W. Freeman is president.

KINGWOOD, W. VA.—The West Penn Power Company, Pittsburgh, contemplates the construction of a new transmission line in this section. A new substation will be erected at Grafton.

MERIDEN, W. VA.—The Rock Island Coal & Coke Company contemplates the installation of a 300-kw. generator set, transformers, motors, etc., at its properties.

WHEELING, W. VA.—Work will soon begin on extensions to the plant of the Beech Bottom (W. Va.) Power Company, including the installation of two complete generating units. The company is controlled by the American Gas & Electric Company, 30 Church Street, New York City.

CLIFTON FORGE, VA.—Plans are being prepared by the Virginia-Western Power Company for extension to its plant at Ronceverte, to cost with equipment and line extensions about $500,000.

WASHINGTON, D. C.—Bids will be called at an early date by the Bureau of Yards and Docks, Navy Department, for alternators and auxiliary equipment for use at the Yorktown, Va., navy yard. (Specification 4612.)

WASHINGTON, D. C.—Bids will be received by the Bureau of Supplies and Accounts, Navy Department, until May 31, for electrical generator equipments for the

navy yards at Newport News, Va., and Camden, N. J. (Schedule 9644.)

WASHINGTON, D. C.—Bids will be received at the Office of the Chief Signal Officer, United States Army, until May 31, for 1,300 ft. switchboard cable, 20-pair with reels; 1,300 ft. switchboard cable, 50-pair with reels; 800 ft. switchboard cable, 100-pair with reels, and thirty-six condensers. (Circular PR 7200A-429 CP.) Also, until May 31, for 110 insulators, 75 mast-top insulators, 100 strain insulators and 300 insulators. (Circular 10813-19 CP.) Also, until May 29, for 400 voltammeters and ten voltmeters. (Circular PR 11130-1 CP.)

WASHINGTON, D. C.—Bids will be received at the office of the chief air service, United States Army, until May 24, for 17,000 ft. electrical airplane wire, covered. (Circular ASA 77.)

## North Central States

DETROIT, MICH. — The Detroit Sand Lime Brick Company, Vinton Building, will erect a power house in connection with its proposed plant at River Rouge.

EATON RAPIDS, MICH.—The Council is considering a proposal from the Eaton Rapids Power Company for light and power service for a period of ten years.

SWANSON, MICH.—The White Rapids Paper Company has applied to the Federal Power Commission for permission to build a 10,000-hp. hydro-electric plant on the Menominee River.

UNION CITY, MICH.—The Council has awarded a contract to the Benjamin Douglass Construction Company, Ann Arbor, for the construction of a hydro-electric power plant on the St. Joseph River, to cost $150,000.

LANCASTER, OHIO. — A power plant will be constructed in connection with the proposed new window-glass manufacturing plant of the Fairfield Glass Company, to cost about $2,500,000. Leopold Hambourg is general manager.

LOUISVILLE, KY.—The Field Packing Company will build a one-story addition to its power house and a new cold-storage plant.

LA SALLE, ILL.—The Citizens' Lighting Company has made application to the Publica Service Commission for permission to issue $350,000 in bonds and $88,000 in capital stock, part of the proceeds to be used for extensions and improvements.

EAU CLAIRE, WIS. — The Wisconsin-Minnesota Light & Power Company will build a 22-mile transmission line for service at Mikana, Campia and Birchwood, to cost about $40,000.

PARK FALLS, WIS. — The Flambeau Paper Company has plans under way for extensions to its works calling for an expenditure of $500,000 for buildings and about the same amount for equipment, which will cover a period of three years. Contract has been awarded for a three-story, 75-ft. x 150-ft. concrete pulp mill to the C. R. Meyer & Sons Construction Company, Oshkosh. The pulp mill at Pixley will be converted into a hydro-electric generating plant when the new pulp mill is completed.

PORTWING, WIS.—The Northern Wisconsin Hydro-Electric Company contemplates the construction of a new hydro-electric power plant. The Jacobson Engineering Company, Metropolitan Bank Building, Minneapolis, is engineer.

AUSTIN, MINN.—Plans are being prepared for the rebuilding of the municipal electric plant, to cost about $100,000. The C. L. Pillsbury Company, 1,200 Second Avenue, South Minneapolis, is engineer.

DETROIT, MINN.—The City Council has engaged L. P. Wolff, engineer, Guardian Life Building, St. Paul, to prepare plans for extensions to the municipal electric light plant, to cost about $40,000.

WINONA, MINN.—The Chicago & Northwestern Railroad Company, 226 West Jackson Boulevard, Chicago, will build a power house in connection with its new local shops, to cost about $500,000.

OSKALOOSA, IOWA.—A special election will be held June 3 to vote on the proposal to issue $300,000 in bonds for the construction of a municipal hydro-electric plant on the Des Moines River. Burns & McDonnell, Interstate Building, Kansas City, Mo., are engineers.

BUNCETON, MO.—F. T. Porter, California, has been granted a franchise to install an electric light and power system in Bunceton.

KANSAS CITY, MO.—The Cavanal Coal Company, Ridge Building, is in the market for equipment for an electric light and power plant at its property at Shady Point, Okla.

KANSAS CITY, MO.—The Kansas City Power & Light Company is installing a 30,000-kva. turbine, and four 1,370-hp. boilers. H. H. Kuhn is assistant chief engineer.

OSCEOLA, MO.—The Council has authorized estimates of cost made for extensions and improvements to the municipal electric plant. A. L. Mullergren, Gates Building, Kansas City, Mo., is consulting engineer.

PARIS, MO.—The Council is considering an issue of $75,000 in bonds for extensions to the municipal electric lighting system. W. B. Rollins & Company, Railway Exchange Building, Kansas City, are engineers.

DOUGLAS, NEB. — The City Council has authorized plans drawn for a transmission line, about 6 miles in length, and distributing system, to cost about $12,000. The Hollister Engineering Company, Bankers' Life Building, Lincoln, is engineer.

## Southern States

GREENSBORO, N. C.—Bids will soon be asked by the City Council for the following work: Installing certain hydro-electric equipment, to cost $20,000; erecting six filtering units of 1,000,000 gal. capacity each, $90,000; construction of Reedy Fork dam, $80,000. J. L. Ludlow, Winston-Salem, is engineer.

SAVANNAH, GA.—The Savannah Electric & Power Company has issued $1,300,000 in bonds, part of the proceeds to be used for extensions and improvements.

GERMANTOWN, TENN.—Plans are being prepared for a municipal electric plant. J. A. Arthur is engineer.

LAWRENCEBURG, TENN.—Plans are under consideration by the City Commission for extensions to the municipal electric plant, including the installation of water-wheels, generator and auxiliaries, to cost about $50,000.

CHARLESTON, ARK. — A company is being organized by E. C. Lichty, Fort Smith, to install and operate an electric plant and system at Charleston.

RISON, ARK.—The Rison Light & Water Company contemplates improvements to its plant, including a new power house.

BATON ROUGE, LA.—The Baton Rouge Electric Company contemplates extensions and improvements to its systems, to cost about $250,000. The work will include an addition to the power plant, line extensions, etc.

MONROE, LA.—The Southwest Pulp & Paper Company, 206 Broadway, Norwich, Conn., it is reported, will open bids early in June for its proposed new pulp and paper mill in Monroe. The plans include a power house and bids for the equipment, and other machinery will be called for early in July. The cost of the plant is estimated at about $250,000. Joseph G. Mayo is president and manager.

BURBANK, OKLA.—The installation of a municipal electric light plant, to cost about $27,000, is under consideration.

PAWNEE, OKLA.—The Council has engaged the Benham Engineering Company, Gimbel Building, Kansas City, Mo., to prepare plans for extensions and improvements to the municipal electric plant and system, to cost about $65,000.

ABILENE, TEX.—The American Public Service Company will build a transmission line to Albany, Sylvester, Buffalo Gap, McCaully and Ovalo. The cost will be financed by residents at the different places requesting service. A line will also be erected from Merkel to Trent.

CARTHAGE, TEX.—The property of the Carthage Ice & Light Company has been purchased by the Central Texas Power Company, San Antonio. A high-tension transmission line will be erected from the Central Texas Company's plant at Center to supply electricity in Carthage.

CLERMONT, TEX. — Extensions to the municipal electric plant, including the installation of new equipment, have been authorized by the Council.

DALLAS, TEX.—Plans for improvements to be made by the Dallas Power & Light Company, involving an expenditure of $205,400, have been approved by the City Commission. The work includes the erection of a large cable from the main power plant on Trinity River to the Jackson Street substation, to cost $53,000; the installation of a motor-generator set in the East Dallas power station, $41,500, and the erection of a transmission line to Trinity Heights to connect with the lines of the Texas Power & Light Company, $110,900.

LIVINGSTON, TEX.—A bond issue of $30,000 for the installation of a municipal electric light plant has been approved by the voters.

TEXLINE, TEX.—Work will begin at once on the construction of a municipal electric light and power plant. E. W. Baker, Oklahoma City, is engineer. H. H. Tate is city manager.

## Pacific and Mountain States

SEATTLE, WASH.—The Council is considering the installation of an ornamental lighting system in the University district.

TACOMA, WASH. — The Lighting Department has advertised for bids for equipment for an 9,000-kva. auxiliary steam plant to be operated in conjunction with the hydro-electric plant on the Nisqually River. The plant will be located on Dock Street at the plant of the Consumers' Central Heating Company. The equipment will include two turbo-generator units. Llewllyn R. Evans is superintendent of the municipal electric plant.

RIDDLE, ORE.—D. S. Riddle has applied to the State Engineer for permission to appropriate water rights on the South Umpqua River for the development of 250 hp. to supply electricity for lamps and motors in the town of Riddle and vicinity.

BANNING, CAL.—The Southern Sierras Power Company, Riverside, is planning to construct a hydro-electric plant on Snow Creek, about 15 miles from Banning, with initial capacity of 4,200 hp.

LOS ANGELES, CAL.—Plans have been completed by the Municipal Electric Bureau for a power house to be erected at Harbor Boulevard and Regan Street, to cost about $300,000, of which about $150,000 will be expended for equipment.

LOS ANGELES, CAL.—The Board of Works has approved plans for an ornamental lighting system on Figueroa Street, comprising sixty standards and 250-cp. lamps.

MADERA, CAL.—The Madera Irrigation District has applied to the State Water Commission for water rights on the San Joaquin River for the construction of a hydro-electric plant to develop about 100,000 hp.

MODESTO, CAL.—The Council contemplates the installation of an ornamental lighting system on Sycamore Avenue, from Needham to Stoddard Street.

REEDLEY, CAL.—A power house will be constructed in connection with the new group of high school buildings, to cost $450,000. Norman F. Marsh, Broadway Central Building, Los Angeles, is architect.

SAN FRANCISCO, CAL. — Plans are being prepared by the Pacific Gas & Electric Company for the erection of substations at Turlock, Riverbank, O'Banion Corners and Hughson, to cost about $75,000 each.

SAN FRANCISCO, CAL.—The Kaweah Molybdenum Mines Company has applied to the State Water Commission for water rights on the Keweah River, Tulare County, for a hydro-electric plant, for use at its properties in this section.

SAN FRANCISCO, CAL.—Roy H. Elliott, 1213 Hobart Building, and associates have been granted permission by the State Water Commission to construct and operate a series of hydro-electric power plants, to be located on the Middle Fork of the Yuba River, Milton Creek, Sardine Creek and other streams in Sierra and Nevada Counties, to develop about 60,500 hp., at a cost of about $2,700,000.

WATERMAN, CAL.—The Preston School of Industry has been granted permission by the State Water Commission to construct a hydro-electric plant on Sutter Creek, to cost about $75,000.

GRIMES PASS, IDAHO. — The power plant of the Boston-Idaho Gold Mine Company on the Payette River at Grimes Pass was recently destroyed by fire, causing a loss of between $75,000 and $100,000.

COLUMBIA FALLS, MONT.—The Cyanide Gold Mining Company contemplates the construction of a power plant in connection with a new mill and cyanide plant.

## Canada

VERNON, B. C.—The construction of a hydro-electric plant at Shuswap Falls, to cost about $25,000, is under consideration by the Town Council.

WINDSOR, N. S. — Bids will soon be asked by the Avon Power Company for the construction of a power plant on Avon River to develop 3,000 hp. The work will include a canal 2,000 ft. long and 16 ft. wide, concrete dam, etc., to cost about $250,000. Further information may be obtained from R. A. Jodrey, Wolfville, or T. B. Akin, Windsor.

EMERSON, ONT.—The installation of an electric lighting plant, to cost about $10,000, is under consideration by the Town Council. L. H. Ashby is clerk.